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ANNOUNCEMENT AND CALL FOR RESEARCH

MSI Competition—*JMR* Special Issue
Practitioner–Academic Collaborative Research

Purpose To stimulate practitioner–academic collaborative research that leads to publications that reflect, derive from, and/or influence business practice.

There is increasing concern about the possible divergence between the research conducted by academics and the problems faced by managers One aspect of this divergence is that executives are voicing concerns about the relevance of academic research for important industry problems This issue has many contributing factors, and it will be difficult, if not impossible, to resolve all the underlying concerns Nevertheless, the Marketing Science Institute and *Journal of Marketing Research* are focused on bridging the gap between academics and practitioners with research that is relevant and rigorous To stimulate closer collaboration between academics and industry experts and to increase the supply of research that is both scientifically rigorous and practically relevant, the Marketing Science Institute and *Journal of Marketing Research* are jointly sponsoring a research competition, a conference, and a special issue of *JMR* that will focus on rigorous research that addresses problems of importance to marketing managers

The research competition, conference, and special issue are designed to stimulate practitioner–academic collaborative research Ideally, the collaborative effort will use both parties' strengths. For example, managers often lack sufficient resources to resolve important problems and academics often have tools that can provide relevant insights but lack the data needed to address the important problems The intention of this announcement and call is to stimulate interaction between practitioners and academics in ways that result in new insights into important problems, potentially resulting in practitioner–academic coauthored papers

Both MSI and *JMR* realize that the goals of practitioners and academics are not the same Whereas practitioners and academics share an interest in customers, competitors, and markets, practitioners are more concerned with actionable results, specific knowledge, proprietary advantage, and "how-to" knowledge (e g , how to increase sales) In contrast, academics tend to focus on general knowledge, theory development, dissemination of results, and "why" knowledge (e g , the process by which advertising affects sales) It is also well known that the incentive and reward systems for members of the two groups are disparate Because these differences are endemic and are not about to disappear, MSI and *JMR* intend to enhance the interaction by eliciting research abstracts

Submitted abstracts will be evaluated by leading academics and practitioners associated with MSI Authors of the best abstract will receive a prize of $3,000 In addition, the authors of abstracts that represent innovative research that addresses important marketing problems will be invited to present their work at a special MSI/*JMR* conference to be held December 9–10, 2004 Those authors will also be encouraged to submit their completed papers for review for the special issue of *JMR* associated with the competition

Qualification for submission Research projects must have substantial practitioner contribution and must address a problem of fundamental interest to marketing managers. Research that is designed to explore important phenomena or to aid managers in making decisions will be considered. The level of practitioner involvement might range from in-depth research collaboration resulting in co-authorship to significant advisory involvement that results in a short note or commentary that could be included with papers accepted for the special issue of *JMR*.

In addition to theory, model, and/or hypotheses, detailed abstracts (4–5 pages) should report the roles to be played by both practitioner and academic partners in the research, the important managerial problem addressed, and the methods and analyses planned.

Topics that are appropriate for the research competition include the research areas outlined in MSI's Research Priorities:

- Assessing marketing productivity
- Brands and branding
- Managing customers
- Growth, innovation, and new products
- Understanding customers
- The role of marketing
- Collecting, interpreting, and using information
- Integrated marketing and communications
- Channels
- Marketing and society
- Pricing, bundles, and promotions

A richer description of these Research Priorities is available on the MSI Web site (http://www.msi.org). Other research topics are also appropriate if they are identified as important problems by the practitioner contributor(s) to the research project.

The advisory board for the research competition includes:

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Abstracts should be submitted by March 1, 2004 to the Collaborative Research Competition, c/o Ross Rizley, Research Director, Marketing Science Institute, 1000 Massachusetts Avenue, Cambridge, MA 02138, or e-mail to rizley@msi.org. The prizewinner will be announced on April 15, 2004. Authors of those abstracts selected for the Collaborative Research Conference will also be notified on April 15, 2004. The Collaborative Research Conference will be held December 9–10, 2004.

To be considered for inclusion into the special issue of *JMR*, a completed version of the paper is due on March 31, 2005. It will then go through the regular *JMR* review process.

Research Competition, Conference, and Special Issue Co-Chairs

Leigh McAlister, Executive Director, Marketing Science Institute
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Stephen L. Vargo & Robert F. Lusch

Evolving to a New Dominant Logic for Marketing

Marketing inherited a model of exchange from economics, which had a dominant logic based on the exchange "goods," which usually are manufactured output The dominant logic focused on tangible resources, embedde value, and transactions Over the past several decades, new perspectives have emerged that have a revised logi focused on intangible resources, the cocreation of value, and relationships The authors believe that the new per spectives are converging to form a new dominant logic for marketing, one in which service provision rather tha goods is fundamental to economic exchange The authors explore this evolving logic and the corresponding shi in perspective for marketing scholars, marketing practitioners, and marketing educators

The formal study of marketing focused at first on the distribution and exchange of commodities and manufactured products and featured a foundation in economics (Marshall 1927, Shaw 1912, Smith 1904) The first marketing scholars directed their attention toward commodities exchange (Copeland 1920), the marketing institutions that made goods available and arranged for possession (Nystrom 1915, Weld 1916), and the functions that needed to be performed to facilitate the exchange of goods through marketing institutions (Cherington 1920, Weld 1917)

By the early 1950s, the functional school began to morph into the marketing management school, which was characterized by a decision-making approach to managing the marketing functions and an overarching focus on the customer (Drucker 1954, Levitt 1960, McKitterick 1957) McCarthy (1960) and Kotler (1967) characterized marketing as a decision-making activity directed at satisfying the customer at a profit by targeting a market and then making optimal decisions on the marketing mix, or the "4 P's " The fundamental foundation and the tie to the standard economic model continued to be strong The leading marketing management textbook in the 1970s (Kotler 1972, p 42, emphasis in original) stated that "marketing management seeks to determine the settings of the company's *marketing decision variables* that will maximize the company's objective(s) in the light of the expected behavior of noncontrollable *demand variables* "

Beginning in the 1980s, many new frames of reference that were not based on the 4 P's and were largely independent of the standard microeconomic paradigm began to emerge What appeared to be separate lines of thought surfaced in relationship marketing, quality management, ma ket orientation, supply and value chain managemen resource management, and networks Perhaps most notabl was the emergence of services marketing as a subdisciplin following scholars' challenges to "break free" (Shostac 1977) from product marketing and recognize the inadequa cies of the dominant logic for dealing with service marketing's subject matter (Dixon 1990) Many scholar believed that marketing thought was becoming more frag mented On the surface, this appeared to be a reasonabl characterization

In the early 1990s, Webster (1992, p 1) argued, "Th historical marketing management function, based on th microeconomic maximization paradigm, must be criticall examined for its relevance to marketing theory and prac tice" At the end of the twentieth century, Day and Mont gomery (1999, p 3) suggested that "with growing reserva tion about the validity or usefulness of the Four P's concep and its lack of recognition of marketing as an innovating adaptive force, the Four P's now are regarded as merely handy framework" At the same time, advocating a networ perspective, Achrol and Kotler (1999, p 162) stated, "Th very nature of network organization, the kinds of theorie useful to its understanding, and the potential impact on th organization of consumption all suggest that a paradig shift for marketing may not be far over the horizon" Shet and Parvatiyar (2000, p 140) suggested that "an alternativ paradigm of marketing is needed, a paradigm that ca account for the continuous nature of relationships amon marketing actors" They went as far as stating (p 140) th the marketing discipline "give up the sacred cow exchange theory" Other scholars, such as Rust (1998 called for convergence among seemingly divergent views

Fragmented thought, questions about the future of ma keting, calls for a paradigm shift, and controversy over se vices marketing being a distinct area of study—are thes calls for alarm? Perhaps marketing thought is not so muc fragmented as it is evolving toward a new dominant logi Increasingly, marketing has shifted much of its domina logic away from the exchange of tangible goods (manufa tured things) and toward the exchange of intangibles, sp

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ialized skills and knowledge, and processes (doing things for and with), which we believe points marketing toward a more comprehensive and inclusive dominant logic, one that ntegrates goods with services and provides a richer foundation for the development of marketing thought and practice

Rust (1998, p 107) underscores the importance of such an integrative view of goods and services "[T]he typical service research article documented ways in which services were different from goods It is time for a change Service research is not a niche field characterized by arcane points of difference with the dominant goods management field" The dominant, goods-centered view of marketing not only may hinder a full appreciation for the role of services but also may partially block a complete understanding of marketing in general (see, e g , Gronroos 1994, Kotler 1997, Normann and Ramirez 1993, Schlesinger and Heskett 1991) For example, Gummesson (1995, pp 250–51, emphasis added) states the following

> Customers do not buy goods or services [T]hey buy offerings which render services which create value The traditional division between goods and services is long outdated It is not a matter of redefining services and seeing them from a customer perspective, *activities render services, things render services* The shift in focus to services is a shift from the means and the producer perspective to the utilization and the customer perspective

The purpose of this article is to illuminate the evolution of marketing thought toward a new dominant logic A summary of this evolution over the past 100 years is provided in Table 1 and Figure 1 Briefly, marketing has moved from a goods-dominant view, in which tangible output and discrete transactions were central, to a service-dominant view, in which intangibility, exchange processes, and relationships are central It is worthwhile to note that the service-centered view should not be equated with (1) the restricted, traditional conceptualizations that often treat services as a residual (that which is not a tangible good, e g , Rathmell 1966), (2) something offered to enhance a good (value-added services), or (3) what have become classified as services industries, such as health care, government, and education Rather, we define *services* as the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself Although our definition is compatible with narrower, more traditional definitions, we argue that it is more inclusive and that it captures the fundamental function of all business enterprises [1] Thus, the service-centered dominant logic represents a reoriented philosophy that is applicable to all marketing offerings, including those that involve tangible output (goods) in the process of service provision

A Fundamental Shift in Worldview

To unravel the changing worldview of marketing or its dominant logic, we must see into, through, and beyond the extant marketing literature A worldview or dominant logic is never clearly stated but more or less seeps into the individual and collective mind-set of scientists in a discipline Predictably, this requires viewing the world at a highly abstract level We begin our discussion with the work of Thomas Malthus

In his analysis of world resources, Thomas Malthus (1798) concluded that with continued geometric population growth, society would soon run out of resources In a Malthusian world, "resources" means natural resources that humans draw on for support Resources are essentially "stuff" that is static and to be captured for advantage In Malthus's time, much of the political and economic activity involved individual people, organizations, and nations working toward and struggling and fighting over acquiring this stuff Over the past 50 years, resources have come to be viewed not only as stuff but also as intangible and dynamic functions of human ingenuity and appraisal, and thus they are not static or fixed Everything is neutral (or perhaps even a resistance) until humankind learns what to do with it (Zimmerman 1951) Essentially, resources *are* not, they *become* As we discuss, this change in perspective on resources helps provide a framework for viewing the new dominant logic of marketing

Constantin and Lusch (1994) define *operand resources* as resources on which an operation or act is performed to produce an effect, and they compare operand resources with *operant resources*, which are employed to act on operand resources (and other operant recourses) During most of civilization, human activity has been concerned largely with acting on the land, animal life, plant life, minerals, and other natural resources Because these resources are finite, nations, clans, tribes, or other groups that possessed natural resources were considered wealthy A goods-centered dominant logic developed in which the operand resources were considered primary A firm (or nation) had factors of production (largely operand resources) and a technology (an operant resource), which had value to the extent that the firm could convert its operand resources into outputs at a low cost Customers, like resources, became something to be captured or acted on, as English vocabulary would eventually suggest, we "segment" the market, "penetrate" the market, and "promote to" the market all in hope of attracting customers Share of operand resources and share of (an operand) market was the key to success

Operant resources are resources that produce effects (Constantin and Lusch 1994) The relative role of operant resources began to shift in the late twentieth century as humans began to realize that skills and knowledge were the most important types of resources Zimmermann (1951) and Penrose (1959) were two of the first economists to recognize the shifting role and view of resources As Hunt (2000, p 75) observes, Penrose did not use the popular term "factor of production" but rather used the term "collection of productive resources" Penrose suggested (pp 24–25, emphasis in original) that "it is never *resources* themselves that are the

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[1] Typical traditional definitions include those of Lovelock (1991, p 13), "services are deeds, processes, and performances", Solomon and colleagues (1985, p 106), "services marketing refers to the marketing of activities and processes rather than objects", and Zeithaml and Bitner (2000), "services are deeds, processes, and performances" For a definition consistent with the one we adopt here, see Gronroos (2000)

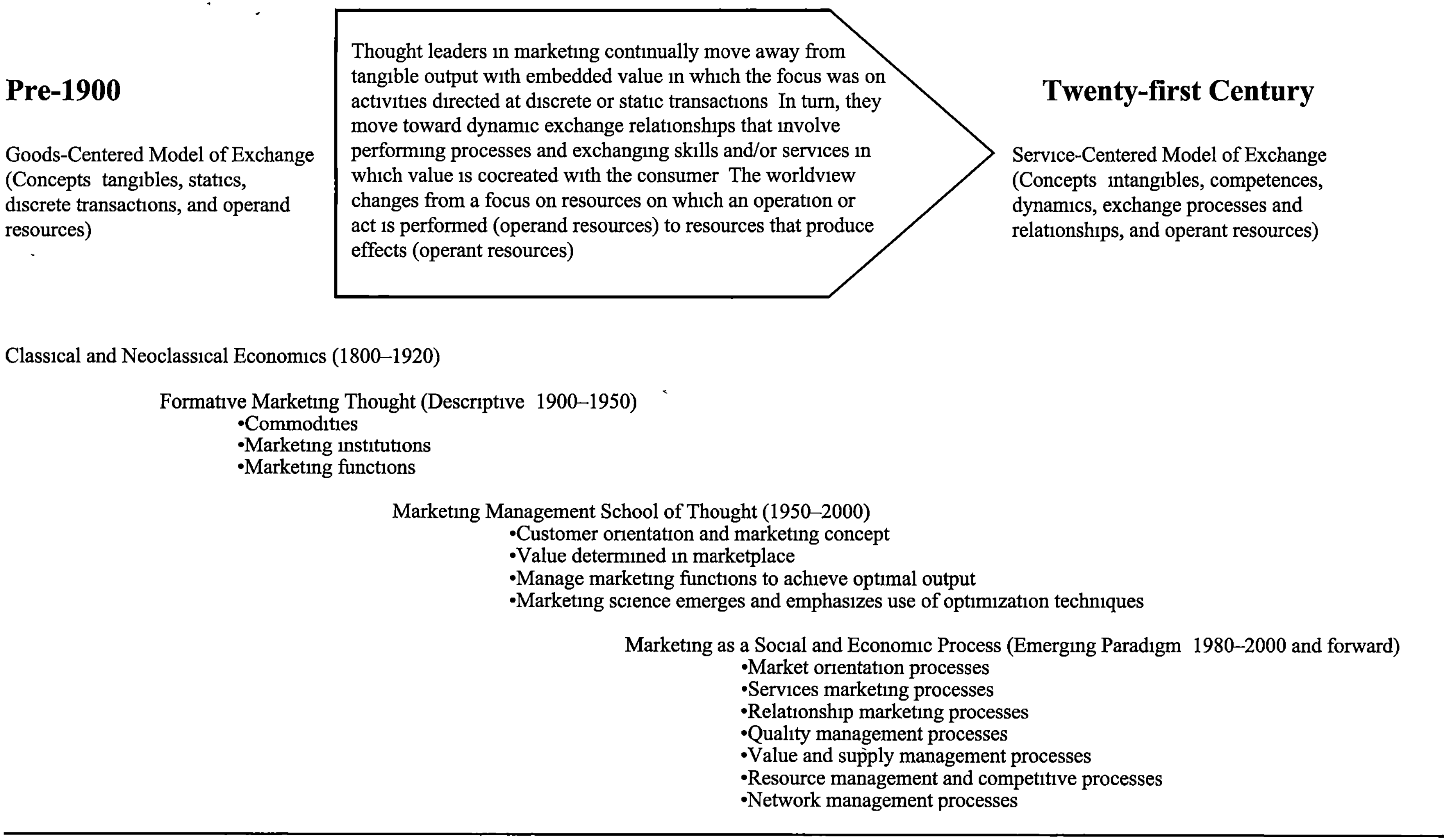
TABLE 1
Schools of Thought and Their Influence on Marketing Theory and Practice

Timeline and Stream of Literature	Fundamental Ideas or Propositions
1800–1920: Classical and Neoclassical Economics Marshall (1890), Say (1821), Shaw (1912), Smith (1776)	Economics became the first social science to reach the quantit tive sophistication of the natural sciences Value is embedded i matter through manufacturing (value-added, utility, value i exchange), goods come to be viewed as standardized outp (commodities) Wealth in society is created by the acquisition tangible "stuff" Marketing as matter in motion
1900–1950: Early/Formative Marketing •Commodities (Copeland 1923) •Institutions (Nystrom 1915, Weld 1916) •Functional (Cherington 1920, Weld 1917)	Early marketing thought was highly descriptive of commoditie institutions, and marketing functions commodity school (chara teristics of goods), institutional school (role of marketing institutior in value-embedding process), and functional school (functions th marketers perform) A major focus was on the transaction or outp and how institutions performing marketing functions added value t commodities Marketing primarily provided time and place utilit and a major goal was possession utility (creating a transfer of titl and/or sale) However, a focus on functions is the beginning of th recognition of operant resources
1950–1980: Marketing Management •Business should be customer focused (Drucker 1954, McKitterick 1957) •Value "determined" in marketplace (Levitt 1960) •Marketing is a decision-making and problem-solving function (Kotler 1967, McCarthy 1960)	Firms can use analytical techniques (largely from microeconomic to try to define marketing mix for optimal firm performance Valu "determined" in marketplace, "embedded" value must have usefu ness Customers do not buy things but need or want fulfillmen Everyone in the firm must be focused on the customer because th firm's only purpose is to create a satisfied customer Identificatio of the functional responses to the changing environment that pr vide competitive advantage through differentiation begins to shi toward value in use
1980–2000 and Forward: Marketing as a Social and Economic Process •Market orientation (Kohli and Jaworski 1990, Narver and Slater 1990) •Services marketing (Gronroos 1984, Zeithaml, Parasuraman, and Berry 1985) •Relationship marketing (Berry 1983, Duncan and Moriarty 1998, Gummesson 1994, 2002, Sheth and Parvatiyar 2000) •Quality management (Hauser and Clausing 1988, Parasuraman, Zeithaml, and Berry 1988) •Value and supply chain management (Normann and Ramirez 1993, Srivastava, Shervani, and Fahey 1999) •Resource management (Constantin and Lusch 1994, Day 1994, Dickson 1992, Hunt 2000, Hunt and Morgan 1995) •Network analysis (Achrol 1991, Achrol and Kotler 1999, Webster 1992)	A dominant logic begins to emerge that largely views marketing a a continuous social and economic process in which opera resources are paramount This logic views financial results not a an end result but as a test of a market hypothesis about a valu proposition The marketplace can falsify market hypotheses, whic enables entities to learn about their actions and find ways to bett serve their customers and to improve financial performance This paradigm begins to unify disparate literature streams in maj areas such as customer and market orientation, services marke ing, relationship marketing, quality management, value and suppl chain management, resource management, and network analysi The foundational premises of the emerging paradigm are (1) skill and knowledge are the fundamental unit of exchange, (2) indire exchange masks the fundamental unit of exchange, (3) goods ar distribution mechanisms for service provision, (4) knowledge is th fundamental source of competitive advantage, (5) all economie are services economies, (6) the customer is always a coproduce (7) the enterprise can only make value propositions, and (8) a se vice-centered view is inherently customer oriented and relational

'inputs' to the production process, but only the *services* that the resources can render"

Operant resources are often invisible and intangible, often they are core competences or organizational processes They are likely to be dynamic and infinite and not static and finite, as is usually the case with operand resources Because operant resources produce effects, they enable humans both to multiply the value of natural resources and to create additional operant resources A well-known illustration of operant resources is the microprocessor Human ingenuity and skills took one of the most plentiful natural resources o Earth (silica) and embedded it with knowledge A Copeland (qtd in Gilder 1984) has observed, in the end th microprocessor is pure idea As we noted previousl resources *are* not, they *become* (Zimmermann 1951) Th service-centered dominant logic perceives operant resource as primary, because they are the producers of effects Thi shift in the primacy of resources has implications for ho exchange processes, markets, and customers are perceive and approached

FIGURE 1
Evolving to a New Dominant Logic for Marketing



Pre-1900

Goods-Centered Model of Exchange (Concepts tangibles, statics, discrete transactions, and operand resources)

Thought leaders in marketing continually move away from tangible output with embedded value in which the focus was on activities directed at discrete or static transactions In turn, they move toward dynamic exchange relationships that involve performing processes and exchanging skills and/or services in which value is cocreated with the consumer The worldview changes from a focus on resources on which an operation or act is performed (operand resources) to resources that produce effects (operant resources)

Twenty-first Century

Service-Centered Model of Exchange (Concepts intangibles, competences, dynamics, exchange processes and relationships, and operant resources)

Classical and Neoclassical Economics (1800–1920)

Formative Marketing Thought (Descriptive 1900–1950)
- Commodities
- Marketing institutions
- Marketing functions

Marketing Management School of Thought (1950–2000)
- Customer orientation and marketing concept
- Value determined in marketplace
- Manage marketing functions to achieve optimal output
- Marketing science emerges and emphasizes use of optimization techniques

Marketing as a Social and Economic Process (Emerging Paradigm 1980–2000 and forward)
- Market orientation processes
- Services marketing processes
- Relationship marketing processes
- Quality management processes
- Value and supply management processes
- Resource management and competitive processes
- Network management processes

Goods Versus Services: Rethinking the Orientation

Viewed in its traditional sense, marketing focuses largely on operand resources, primarily goods, as the unit of exchange In its most rudimentary form, the goods-centered view postulates the following

1 The purpose of economic activity is to make and distribute things that can be sold
2 To be sold, these things must be embedded with utility and value during the production and distribution processes and must offer to the consumer superior value in relation to competitors' offerings
3 The firm should set all decision variables at a level that enables it to maximize the profit from the sale of output
4 For both maximum production control and efficiency, the good should be standardized and produced away from the market
5 The good can then be inventoried until it is demanded and then delivered to the consumer at a profit

Because early marketing thought was concerned with agricultural products and then with other physical goods, it was compatible with this rudimentary view Before 1960, marketing was viewed as a transfer of ownership of goods and their physical distribution (Savitt 1990), it was viewed as the "application of motion to matter" (Shaw 1912, p 764) The marketing literature rarely mentioned "immaterial products" or "services," and when it did, it mentioned them only as "aids to the production and marketing of goods" (Converse 1921, p vi, see Fisk, Brown, and Bitner 1993) An early fragmentation in the marketing literature occurred when Shostack (1977, p 73) noted, "The classical 'marketing mix,' the seminal literature, and the language of marketing all derive from the manufacture of physical-goods "

Marketing inherited the view that value (utility) was embedded in a product from economics One of the first debates in the fledgling discipline of marketing centered on the question, If value was something added to goods, did marketing contribute to value? Shaw (1912, p 12, see also Shaw 1994) argued that "Industry is concerned with the application of motion to matter to change its form and place The change in form we term production, the change in place, distribution" Weld (1916) more formally defined marketing's role in production as the creation of the time, place, and possession utilities, which is the classification found in current marketing literature

The general concept of utility has been broadly accepted in marketing, but its meaning has been interpreted differently For example, discussing Beckman's (1957) and Alderson's (1957) treatments of utility, Dixon (1990, pp 337–38, emphasis in original) argues that "each writer uses a different concept of value Beckman is arguing in terms of *value-in-exchange*, basing his calculation on value-added, upon 'the selling value' of products Alderson is reasoning in terms of *value-in-use* " Drawing on Cox (1965), Dixon (1990, p 342) believes the following

> The "conventional view" of marketing as adding properties to matter caused a problem for Alderson and "makes more difficult a disinterested evaluation of what marketing is and does" (Cox 1965) This view also underlies the dissatisfaction with marketing theory that led to the services marketing literature If marketing is the process that adds properties to matter, then it can not contribute to the production of "immaterial goods "

Alderson (1957, p 69) advised, "What is needed is no an interpretation of the utility created by marketing, but marketing interpretation of the whole process of creatin utility" Dixon (1990, p 342) suggests that "the task o responding to Alderson's challenge remains "

The service-centered view of marketing implies tha marketing is a continuous series of social and economi processes that is largely focused on operant resources wit which the firm is constantly striving to make better valu propositions than its competitors In a free enterprise system, the firm primarily knows whether it is making bette value propositions from the feedback it receives from th marketplace in terms of firm financial performance Because firms can always do better at serving customers an improving financial performance, the service-centered vie of marketing perceives marketing as a continuous learnin process (directed at improving operant resources) Th service-centered view can be stated as follows

1 Identify or develop core competences, the fundamenta knowledge and skills of an economic entity that represen potential competitive advantage
2 Identify other entities (potential customers) that could benefit from these competences
3 Cultivate relationships that involve the customers in developing customized, competitively compelling value propositions to meet specific needs
4 Gauge marketplace feedback by analyzing financial performance from exchange to learn how to improve the firm' offering to customers and improve firm performance

This view is grounded in and largely consistent wit resource advantage theory (Conner and Prahalad 1996, Hun 2000, Srivastava, Fahey, and Christensen 2001) and cor competency theory (Day 1994, Prahalad and Hamel 1990) Core competences are not physical assets but intangibl processes, they are "bundles of skills and technologies' (Hamel and Prahalad 1994, p 202) and are often routines actions, or operations that are tacit, causally ambiguous, an idiosyncratic (Nelson and Winter 1982, Polanyi 1966) Hun (2000, p 24) refers to core competences as higher-orde resources because they are bundles of basic resources Teec and Pisano (1994, p 537) suggest that "the competitiv advantage of firms stems from dynamic capabilities roote in high performance routines operating inside the firm embedded in the firm's processes, and conditioned by it history" Hamel and Prahalad (pp 202, 204) discuss "competition for competence," or competitive advantage resultin from competence making a "disproportionate contributio to customer-perceived value "

The focus of marketing on core competences inherentl places marketing at the center of the integration of busines functions and disciplines As Prahalad and Hamel (1990, p 82) suggest, "core competence is communication, involvement, and a deep commitment to working across organizational boundaries " In addition, they state (p 82) that cor competences are "collective learning in the organization especially [about] how to coordinate diverse productio skills " This cross-functional, intraorganizational boundary spanning also applies to the interorganizational boundaries of vertical marketing systems or networks Channel intermediaries and network partners represent core competences that are organized to gain competitive advantage by performing specialized marketing functions The firms can have long-term viability only if they learn in conjunction with and are coordinated with other channel and network partners

The service-centered view of marketing is customer-centric (Sheth, Sisodia, and Sharma 2000) and market driven (Day 1999) This means more than simply being consumer oriented, it means collaborating with and learning from customers and being adaptive to their individual and dynamic needs A service-centered dominant logic implies that value is defined by and cocreated with the consumer rather than embedded in output Haeckel (1999) observes successful firms moving from practicing a "make-and-sell" strategy to a "sense-and-respond" strategy Day (1999, p 70) argues for thinking in terms of self-reinforcing "value cycles" rather than linear value chains In the service-centered view of marketing, firms are in a process of continual hypothesis generation and testing Outcomes (e g , financial) are not something to be maximized but something to learn from as firms try to serve customers better and improve their performance Thus, a market-oriented and learning organization (Slater and Narver 1995) is compatible with, if not implied by, the service-centered model Because of its central focus on dynamic and learned core competences, the emerging service-centered dominant logic is also compatible with emerging theories of the firm For example, Teece and Pisano (1994, p 540) emphasize that competences and capabilities are "ways of organizing and getting things done, which cannot be accomplished by using the price system to coordinate activity"

Having described the goods- and service-centered views of marketing, we turn to ways that the views are different Six differences between the goods- and service-centered dominant logic, all centered on the distinction between operand and operant resources, are presented in Table 2 The six attributes and our eight foundational premises (FPs) help present the patchwork of the emerging dominant logic

FP$_1$: The Application of Specialized Skills and Knowledge Is the Fundamental Unit of Exchange

People have two basic operant resources physical and mental skills Both types of skills are distributed unequally in a population Each person's skills are not necessarily optimal for his or her survival and well-being, therefore, specialization is more efficient for society and for individual members of society Largely because they specialize in particular skills, people (or other entities) achieve scale effects This specialization requires exchange (Macneil 1980, Smith 1904) Studying exchange in ancient societies, Mauss (1990) shows how division of labor within and between clans and tribes results in the tendering of "total services" by gift giving among clans and tribes Not only do people contract for services from one another by giving and receiving gifts, but, as Mauss (p 6) observes, "there is total service in the sense that it is indeed the whole clan that contracts on behalf of all, for all that it possesses and for all that it does"

This exchange of specializations leads to two views about what is exchanged The first view involves the output from the performance of the specialized activities, the second involves the performance of the specialized activities That is, if two parties jointly provide for each other's carbohydrate and protein needs by having one party specialize in fishing knowledge and skills and the other specialize in farming knowledge and skills, the exchange is one of fish for wheat or of the application of fishing knowledge or competence (fishing services) for the application of farming knowledge or competence (farming services)

The relationships between specialized skills and exchange have been recognized as far back as Plato's time, and the concept of the division of labor served as the foundation for Smith's (1904) seminal work in economics However, Smith focused on only a subclass of human skills the skills that resulted in surplus tangible output (in general, tangible goods and especially manufactured goods) that could be exported and thus contributed to national wealth Smith recognized that the foundation of exchange was human skills as well as the necessity and usefulness of skills that did not result in tangible goods (i e , services), they were simply not "productive" in terms of his national wealth standard More than anything else, Smith was a moral philosopher who had the normative purpose of explaining how the division of labor and exchange should contribute to social well-being In the sociopolitical milieu of his time, social well-being was defined as national wealth, and national wealth was defined in terms of exportable things (operand resources) Thus, for Smith, "productive" activity was limited to the creation of tangible goods, or output that has exchange value

At that time, Smith's focus on exchange value represented a departure from the more accepted focus on value in use, and it had critical implications for how economists, and later marketers, would view exchange Smith was aware of the schoolmen's and early economic scholars' view that "The Value of all Wares arises from their use" (Barbon 1903, p 21) and that "nothing has a price among men except pleasure, and only satisfactions are purchased" (Galiani qtd in Dixon 1990, p 304) But this use–value interpretation was not consistent with Smith's national wealth standard For Smith, "wealth consisted of tangible goods, not the use made of them" (Dixon 1990, p 340) Although most early economists (e g , Mill 1929, Say 1821) took exception to this singular focus on tangible output, they nonetheless acquiesced to Smith's view that the proper subject matter for economic philosophy was the output of "productive" skills or services, that is, tangible goods that have embedded value

Frederic Bastiat was an early economic scholar who did not acquiesce to the dominant view Bastiat criticized the political economists' view that value was tied only to tangible objects For Bastiat (1860, p 40), the foundations of economics were people who have "wants" and who seek "satisfactions" Although a want and its satisfaction are specific to each person, the effort required is often provided by others For Bastiat (1964, pp 161–62), "the great economic law is

TABLE 2
Operand and Operant Resources Help Distinguish the Logic of the Goods- and Service-Centered Views

	Traditional Goods-Centered Dominant Logic	Emerging Service-Centered Dominant Logic
Primary unit of exchange	People exchange for goods These goods serve primarily as *operand resources*	People exchange to acquire the benefits of specialized competences (knowledge and skills), or *services* Knowledge and skills are *operant resources*
Role of goods	Goods are *operand resources* and end products Marketers take matter and change its form, place, time, and possession	Goods are transmitters of *operant resources* (embedded knowledge), they are intermediate "products" that are used by other operant resources (customers) as appliances in value-creation processes
Role of customer	The customer is the recipient of goods Marketers do things to customers, they segment them, penetrate them, distribute to them, and promote to them The customer is an *operand resource*	The customer is a coproducer of service Marketing is a process of doing things in interaction with the customer The customer is primarily an *operant resource,* only functioning occasionally as an operand resource
Determination and meaning of value	Value is determined by the producer It is embedded in the *operand resource (goods) and is defined in terms of* "exchange-value"	Value is perceived and determined by the consumer on the basis of "value in use" Value results from the beneficial application of *operant resources sometimes* transmitted through *operand resources* Firms can only make value propositions
Firm–customer interaction	The customer is an *operand resource* Customers are acted on to create transactions with resources	The customer is primarily an *operant resource* Customers are active participants in relational exchanges and coproduction
Source of economic growth	Wealth is obtained from surplus tangible resources and goods Wealth consists of owning, controlling, and producing *operand resources*	Wealth is obtained through the application and exchange of specialized knowledge and skills It represents the right to the future use of *operant resources*

this *Services are exchanged for services* It is trivial, very commonplace, it is, nonetheless, the beginning, the middle, and the end of economic science" He argued (1860, p 43) the following "[I]t is in fact to this faculty *to work the one for the other,* it is this *transmission of efforts, this exchange of services* [this emphasis added], with all the infinite and involved combinations to which it gives rise which constitutes Economic Science, points out its origin, and determines its limits"

Therefore, value was considered the comparative appreciation of reciprocal skills or services that are exchanged to obtain utility, value meant "value in use" As Mill (1929) did, Bastiat recognized that by using their skills (operant resources), humans could only transform matter (operand resources) into a state from which they could satisfy their desires

However, the narrower focus on the tangible output with exchange value had several advantages for the early economists' quest of turning economic philosophy into an economic science, not the least of which was economics' similarity to the subject matter of the archetypical science of the day Newtonian mechanics The treatment of value as embedded utility, or value added (exchange value), enabled economists (e g , Marshall 1927, Walras 1954) to ignore both the application of mental and physical skills (services that transformed matter into a potentially useful state and the actual usefulness as perceived by the consumer (value in use) Thus, economics evolved into the science of matter (tangible goods) that is embedded with utility, as a result o manufacturing, and has value in exchange

It was from this manufacturing-based view of economics that marketing emerged 100 years later Throughout the period that marketing was primarily concerned with the distribution of physical goods, the goods-centered model wa probably adequate However, as the focus of marketing moved away from distribution and toward the process o exchange, economists began to perceive the accepted idea o marketing adding time, place, and possession utility (Wel

(1916) as inadequate As we noted previously, Alderson (1957, p 69) advised, “What is needed is not an interpretation of the utility created by marketing, but a marketing interpretation of the whole process of creating utility” Shostack (1977, p 74) issued a much more encompassing challenge than to “break [services marketing] free from product marketing”, she argued for a “new conceptual framework” and suggested the following

> One unorthodox possibility can be drawn from direct observation of the nature of market “satisfiers” available to it How should the automobile be defined? Is General Motors marketing a *service*, a service that happens to include a by-product called a car? Levitt's classic “Marketing Myopia” exhorts businessmen to think exactly this generic way about what they market Are automobiles “tangible services”?

Shostack concluded (p 74) that “if ‘either–or’ terms (product [versus] service) do not adequately describe the true nature of marketed entities, it makes sense to explore the usefulness of a new structural definition” We believe that the emerging service-centered model meets Shostack's challenge, addresses Alderson's argument, and elaborates on Levitt's (1960) exhortation

FP$_2$: Indirect Exchange Masks the Fundamental Unit of Exchange

Over time, exchange moved from the one-to-one trading of specialized skills to the indirect exchange of skills in vertical marketing systems and increasingly large, bureaucratic, hierarchical organizations During the same time, the exchange process became increasingly monetized Consequently, the inherent focus on the customer as a direct trading partner largely disappeared Because of industrial society's increasing division of labor, its growth of vertical marketing systems, and its large bureaucratic and hierarchical organizations, most marketing personnel (and employees in general) stopped interacting with customers (Webster 1992) In addition, because of the confluence of these forces, the skills-for-skills (services-for-services) nature of exchange became masked

The Industrial Revolution had a tremendous impact on efficiency, but this came at a price, at least in terms of the visibility of the true nature of exchange Skills (at least “manufacturing” skills, such as making sharp sticks) that had been tailored to specific needs were taken out of cottage industry and mechanized, standardized, and broken down into skills that had increasingly narrow purposes (e g , sharpening one side of sticks) Workers' specialization increasingly became microspecialization (i e , the performance of increasingly narrow-skilled proficiencies) Organizations acquired and organized microspecializations to produce what people wanted, and thus it became easier for people to engage in exchange by providing their microspecializations to organizations However, the microspecialists seldom completed a product or interacted with a customer They were compensated indirectly with money paid by the organization and exchangeable in the market for the skills the microspecialists needed rather than with direct, reciprocal skill-provision by the customer Thus, organizations further masked the skills-for-skills (services-for-services) nature of exchange Organizations themselves specialized (e g , by making sticks but relying on other organizations such as wholesalers and retailers to distribute them), thus further masking the nature of exchange

As organizations continued to increase in size, they began to realize that virtually all their workers had lost sense of both the customer (Hauser and Clausing 1988) and the purpose of their own service provision The workers, who performed microspecialized functions deep within the organization, had internal customers, or other workers One worker would perform a microspecialized task and then pass the work product on to another worker, who would perform an activity, this process continued throughout a service chain Because the workers along the chain did not pay one another (reciprocally exchange with one another) and did not typically deal directly with external customers, they could ignore quality and both internal and external customers To correct for this problem, various management techniques were developed under the rubric of total quality management (Cole and Mogab 1995) The techniques were intended to reestablish the focus of workers and the organization on both internal and external customers and quality

The problem of organizations and their workers not paying attention to the customer is not unique to manufacturing organizations If an organization simply provides intangibles, has some microspecialists who interact with customers, and is in an industry categorized as a “service” industry, it is not necessarily more customer focused Many non-goods-producing organizations, especially large bureaucracies, are just as subject as goods-producing institutions to the masking effect of indirect exchange, they also provide services through organized microspecializations that are focused on minute and isolated aspects of service provision

Regardless of the type of organization, the fundamental process does not change, people still exchange their often collective and distributed specialized skills for the individual and collective skills of others in monetization and marketing systems People still exchange their services for other services Money, goods, organizations, and vertical marketing systems are only the exchange vehicles

FP$_3$: Goods Are Distribution Mechanisms for Service Provision

The view of tangible products as the fundamental components of economic exchange served reasonably well as Western societies entered the Industrial Revolution, and the primary interest of the developing science of economics was manufacturing Given its early concerns with the distribution of manufactured and agricultural goods, the view also worked relatively well when it was adopted by marketing However, marketing has moved well beyond distribution and is now concerned with more than the exchange of goods Goods are not the common denominator of exchange, the common denominator is the application of specialized knowledge, mental skills, and, to a lesser extent, physical labor (physical skills)

Knowledge and skills can be transferred (1) directly, (2) through education or training, or (3) indirectly by embedding them in objects Thus, tangible products can be viewed as embodied knowledge or activities (Normann and Ramirez 1993) Wheels, pulleys, internal combustion engines, and integrated chips are all examples of encapsulated knowledge, which informs matter and in turn becomes the distribution channel for skill application (i e , services)

The matter, embodied with knowledge, is an "appliance" for the performance of services, it replaces direct service Norris (1941, p 136) was one of the first scholars to recognize that people want goods because they provide services Prahalad and Hamel (1990, p 85) refer to products (goods) as "the physical embodiments of one or more competencies" The wheel and pulley reduce the need for physical strength A pharmaceutical provides medical services A well-designed and easy-to-use razor replaces barbering services, and vacuum cleaners and other household appliances make household chores less labor intensive Computers and applications software can substitute for the direct services of accountants, attorneys, physicians, and teachers Kotler (1977, p 8) notes that the "importance of physical products lies not so much in owning them as in obtaining the services they render" Gummesson (1995, p 251) argues that "activities render services, things render services" Hollander (1979, p 43) suggests that "services may be replaced by products" and compares barber shaves to safety razors and laundry services to washing machines

In addition to their direct service provision, the appliances serve as platforms for meeting higher-order needs (Rifkin 2000) Prahalad and Ramaswamy (2000, p 84) refer to the appliances as "artifacts, around which customers have experiences" (see also Pine and Gilmore 1999) Gutman (1982, p 60) has pointed out that products are "means" for reaching "end-states," or "valued states of being, such as happiness, security, and accomplishment" That is, people often purchase goods because owning them, displaying them, and experiencing them (e g , enjoying knowing that they have a sports car parked in the garage, showing it off to others, and experiencing its handling ability) provide satisfactions beyond those associated with the basic functions of the product (e g , transportation) As humans have become more specialized as a species, use of the market and goods to achieve higher-order benefits, such as satisfaction, self-fulfillment, and esteem, has increased Goods are platforms or appliances that assist in providing benefits, therefore, consistent with Gutman, goods are best viewed as distribution mechanisms for services, or the provision of satisfaction for higher-order needs

FP$_4$: Knowledge Is the Fundamental Source of Competitive Advantage

Knowledge is an operant resource It is the foundation of competitive advantage and economic growth and the key source of wealth Knowledge is composed of propositional knowledge, which is often referred to as abstract and generalized, and prescriptive knowledge, which is often referred to as techniques (Mokyr 2002) The techniques are the skills and competences that entities use to gain competitive advantage This view is consistent with current economic thought that the change in a firm's productivity is primarily dependent on knowledge or technology (Capon and Glazer 1987, Nelson, Peck, and Kalachek 1967) Capon and Glazer (1987) broadly define *technology* as know-how, and they identify three components of technology (1) product technology (i e , ideas embodied in the product), (2) process technology (i e , ideas involved in the manufacturing process), and (3) management technology (i e , management procedures associated with business administration and sales) Mokyr (2002) reviews historical developments in science and technology to demonstrate that the Industrial Revolution was essentially about the creation and dissemination of propositional and prescriptive knowledge

In the neoclassical model of economic growth, the development of knowledge in society is exogenous to the competitive system However, in Hunt's (2000) general theory of competition, knowledge is endogenous The process of competition and the information provided by profits result in competition being a knowledge-discovery process (Hayek 1945, Hunt 2000) Therefore, not only are mental skills the fundamental source of competitive advantage, but competition also enhances mental skills and learning in society Dickson (1992) suggests that the firms that do the best are the firms that learn most quickly in a dynamic and evolving competitive market

Quinn, Doorley, and Paquette (1990, p 60) state that "physical facilities—including a seemingly superior product—seldom provide a sustainable competitive edge" Quinn, Doorley, and Paquette's suggestion that "a maintainable advantage usually derives from outstanding depth in selected human skills, logistics capabilities, knowledge bases, or other service strengths that competitors cannot reproduce and that lead to greater demonstrable value for the customer" is consistent with our own views Normann and Ramirez (1993, p 69) state, "the only true source of competitive advantage is the ability to conceive the entire value-creating system and make it work" Day (1994) discusses competitive advantage in terms of capabilities or skills, especially those related to market-sensing, customer-linking, and channel-bonding Barabba (1996, p 48) argues that marketing-based knowledge and decision making provide the core competence that "gives the enterprise its competitive edge" These views imply that operant resources, specifically the use of knowledge and mental competences, are at the heart of competitive advantage and performance

The use of knowledge as the basis for competitive advantage can be extended to the entire "supply" chain, or service-provision chain The goods-centered model necessarily assumes that the primary flow in the chain is a physical flow, but it acknowledges the existence of information flows We argue that the primary flow is information, *service* is the provision of the information to (or use of the information for) a consumer who desires it, with or without an accompanying appliance Evans and Wurster (1997, p 72) state this idea as follows "[T]he value chain also includes all the information that flows within a company and between a company and its suppliers, its distributors, and its existing or potential customers Supplier relationships, brand identity, process coordination, customer loyalty, employee loyalty, and switching costs all depend on various kinds of information" Evans and Wurster suggest that every business is an information business It is through the differential use of information, or knowledge, applied in concert with the knowledge of other members of the service chain that the firm is able to make value propositions to the consumer and gain competitive advantage Normann and Ramirez (1993, pp 65–66) argue that value creation should not be considered in terms of the "outdated" value-added notion, "grounded in the assumptions and models of an industrial economy," but in terms of the value created through "coproduction with suppliers, business partners, allies, and customers"

The move toward a service-dominant logic is grounded n an increased focus on operant resources and specifically on process management Webster (1992) and Day (1994) emphasize the importance of marketing being central to cross-functional business processes To better manage the processes, Moorman and Rust (1999) suggest that firms are shifting away from a functional marketing organization and oward a marketing process organization Taking this even further, Srivastava, Shervani, and Fahey (1999, p 168) conend that the enterprise consists of three core business processes (1) product development management, (2) supply chain management, and (3) customer relationship management They also contend that marketing must be a critical part of all these core business processes "that create and susain customer and shareholder value" Similarly, Barabba 1996) argues that marketing is an organizational "state of mind"

FP$_5$: All Economies Are Services Economies

As we have argued, the fundamental economic exchange process pertains to the application of mental and physical kills (service provision), and manufactured goods are mechanisms for service provision However, economic science, as well as most classifications of economic exchange hat are based on it, is grounded on Smith's narrowed concern with manufactured output Consequently, services have raditionally been defined as anything that does not result in manufactured (or agricultural) output (e g , Rathmell 1966)

In addition, as we have suggested, specialization breeds microspecialization, people are constantly moving toward more specific specialties Over time, activities and processes hat were once routinely performed internally by a single conomic entity (e g , a manufacturing firm) become sepaate specializations, which are then often outsourced Shugan 1994) Giarini (1985, p 134) refers to this increasing specialization as "complification" The complification process causes distortions in national economic accounting ystems, such as the one used in the United States, that are ased on types of output (e g , agricultural, manufacturing, intangible) The U S government is aware of these distortions, as is evidenced in the Economic Classification Policy Committee of the Bureau of Economic Analysis's (1994, pp –4) citation of Hill (1977, p 320) on the issue

> [O]ne in the same activity, such as painting, may be classified as goods or service production depending purely on the organization of the overall process of production If the painting is done by employees within the producer unit [that] makes the good, it will be treated as [part of] the goods production, whereas if it is done by an outside painting company, it will be classified as an intermediate input of services Thus, when a service previously performed in a manufacturing establishment is contracted out, to a specialized services firm, data will show an increase in services production in the economy even though the total activity of "painting," may be unchanged

It is because of the differentiation of specialized skills (services) in an output-based classification model rather than a fundamental economic shift that scholars definitionally, rather than functionally, have only recently considered that a shift is occurring toward a "services economy" (see Shugan 1994)

Similarly, economists have taught marketing scholars to think about economic development in terms of "eras" or "economies," such as hunter-gatherer, agricultural, and industrial Formal economic thought developed during one of these eras, the industrial economy, and it has tended to describe economies in terms of the types of output, or operand resources (game, agricultural products, and manufactured products), associated with markets that were expanding rapidly at the time However, the "economies" might be better viewed as macrospecializations, each characterized by the expansion and refinement of some particular type of competence (operant resource) that could be exchanged The hunter-gatherer macrospecialization was characterized by the refinement and application of foraging and hunting knowledge and skills, the agricultural macrospecialization by the cultivation of knowledge and skills, the industrial economy by the refinement of knowledge and skills for large-scale mass production and organizational management, and the services and information economies by the refinement and use of knowledge and skills about information and the exchange of pure, unembedded knowledge

In both the classification of economic activity and the economic eras, the common denominator is the increased refinement and exchange of knowledge and skills, or operant resources Virtually all the activities performed today have always been performed in some manner, however, they have become increasingly separated into specialties and exchanged in the market

All this may seem to be an argument that traditional classificatory systems underestimate the historical role and rise of services In a sense, it is Services are not just now becoming important, but just now they are becoming more apparent in the economy as specialization increases and as less of what is exchanged fits the dominant manufactured-output classification system of economic activity Services and the operant resources they represent have always characterized the essence of economic activity

FP$_6$: The Customer Is Always a Coproducer

From the traditional, goods-based, manufacturing perspective, the producer and consumer are usually viewed as ideally separated in order to enable maximum manufacturing efficiency However, if the normative goal of marketing is customer responsiveness, this manufacturing efficiency comes at the expense of marketing efficiency and effectiveness From a service-centered view of marketing with a heavy focus on continuous processes, the consumer is always involved in the production of value Even with tangible goods, production does not end with the manufacturing process, production is an intermediary process As we have noted, goods are appliances that provide services for and in conjunction with the consumer However, for these services to be delivered, the customer still must learn to use, maintain, repair, and adapt the appliance to his or her unique needs, usage situation, and behaviors In summary, in using a product, the customer is continuing the marketing, consumption, and value-creation and delivery processes

Increasingly, both marketing practitioners and academics are shifting toward a continuous-process perspective, in which separation of production and consumption is not a normative goal, and toward a recognition of the advantages, if not the necessity, of viewing the consumer as a coproducer Among academics, Normann and Ramirez (1993, p 69) state that "the key to creating value is to coproduce offerings that mobilize customers" Lusch, Brown, and Brunswick (1992) provide a general model to explain how much of the coproduction or service provision the customer will perform Oliver, Rust, and Varki (1998) echo and extend the idea of coproduction in their suggestion that marketing is headed toward a paradigm of "real-time" marketing, which integrates mass customization and relationship marketing by interactively designing evolving offerings that meet customers' unique, changing needs Prahalad and Ramaswamy (2000) note that the market has become a venue for proactive customer involvement, and they argue for co-opting customer involvement in the value-creation process In summary, the customer becomes primarily an operant resource (coproducer) rather than an operand resource ("target") and can be involved in the entire value and service chain in acting on operand resources

FP$_7$: The Enterprise Can Only Make Value Propositions

As we noted previously, marketing inherited a view that value was something embedded in goods during the manufacturing process, and early marketing scholars debated the issue of the types and extent of the utilities, or value-added, that were created by marketing processes This value-added view functioned reasonably well as long as the focus of marketing remained the tangible good However, arguably, it was the inadequacy of the value-added concept that necessitated the delineation of the consumer orientation—essentially, the admonition that the consumer ultimately needed to find embedded value (value in exchange) useful (value in use) As Dixon (1990, p 342) notes, the "conventional view of marketing adding properties to marketing underlies the dissatisfaction with marketing theory that led to the services marketing literature" (see also Shaw 1994)

Services marketing scholars have been forced both to reevaluate the idea of value being embedded in tangible goods and to redefine the value-creation process As with much of the reexamination and redefinition that has originated in the services marketing literature, the implications can be extended to all of marketing For example, Gummesson (1998, p 247) has argued that "if the consumer is the focal point of marketing, value creation is only possible when a good or service is consumed An unsold good has no value, and a service provider without customers cannot produce anything" Likewise, Gronroos (2000, pp 24–25, emphasis in original) states,

> *Value for customers is created throughout the relationship by the customer, partly in interactions between the customer and the supplier or service provider* The focus is not on products but on the customers' *value-creating processes* where value emerges for customers and is perceived by them, the focus of marketing is *value* creation rather than value distribution, and facilitation and support of a value-creating process rather than simply distributing ready-made value to customers

We agree with both Gummesson and Gronroos, and we extend their logic by noting that the enterprise can only offer value propositions, the consumer must determine value and participate in creating it through the process of coproduction

If a tangible good is part of the offering, it is embedded with knowledge that has value potential for the intended consumer, but it is not embedded with value (utility) The consumer must understand that the value potential is translatable to specific needs through coproduction The enterprise can only make value propositions that strive to be better or more compelling than those of competitors

FP$_8$: A Service-Centered View Is Customer Oriented and Relational

Interactivity, integration, customization, and coproduction are the hallmarks of a service-centered view and its inherent focus on the customer and the relationship Davis and Manrodt (1996, p 6) approach a service-centered view in their discussion of the customer-interaction process

> [It] begins with the interactive definition of the individual customers' problem, the development of a customized solution, and delivery of that customized solution to the customer The solution may consist of a tangible product, an intangible service, or some combination of both It is not the mix of the solution (be it product or service) that is important, but that the organization interacts with each customer to define the specific need and then develops a solution to meet the need

It is in this sense of doing things, not just for the customer but also in concert with the customer, that the service-centered view emerges It is a model of inseparability of the one who offers (and the offer) and the consumer Barabba (1995, p 14) extends the customer-centric idea to the "integration of the voice of the market with the voice of the enterprise," and Gummesson (2002) suggests the term "balanced centricity," concepts that may be particularly compatible with a services-for-services exchange perspective We also suggest that the interactive and integrative view of exchange is more compatible with the other normative elements of the marketing concept, the idea that all activities of the firm be integrated in their market responsiveness and the idea that profits come from customer satisfaction (rather than units of goods sold) (Kohli and Jaworski 1990, Narver and Slater 1990) Notably, this view harks back to pre–Industrial Revolution days, when providers were close to their customers and involved in relationships that offered customized services Hauser and Clausing (1988, p 64) observe the following

> Marketing, engineering, and manufacturing were integrated—in the same individual If a knight wanted armor, he talked directly to the armorer, who translated the knight's desires into a product, the two might discuss the material—plate rather than chain armor—and details like fluted surface for greater bending strength Then the armorer would design the production process

Consistent with this view, Gummesson (1998, p 243) suggests that services marketing research, and its emphasis on relationships and interaction, is one of the two "most crucial contributions" to relationship marketing, the other is the network approach to industrial marketing Similarly, Glynn and Lehtinen (1995) note that services scholars' recognition of characteristics of intangibility, inseparability, and heterogeneity has forced a focus on interaction and relationships At least in the U S marketing literature (Berry 1983), the term "relationship marketing" originated in the services literature (Gronroos 1994)

Although the output-based, goods-centered paradigm is compatible with deterministic models of moving things through spatial dimensions (e g , distribution of goods), it is considerably less compatible with models of relationship In their role as distribution mechanisms for service provision (FP$_3$), goods may be instrumental in relationships, but they are not parties to the relationship, inanimate items of exchange cannot have relationships Over the past 50 years, marketing has been transitioning from a product and production focus to a consumer focus and, more recently, from a transaction focus to a relationship focus The common denominator of this customer-centric, relational focus is a view of exchange that is driven by the individual consumer's perceived benefits from potential exchange partners' offerngs In general, consumers do not need goods They need to perform mental and physical activities for their own benefit, o have others perform mental and physical activities for hem (Gummesson 1995, Kotler 1977), or to have goods that assist them with these activities In summary, they need services that satisfy their needs

It might be argued that at least some firms and customers eek single transactions rather than relationships If "relaionship" is understood in the limited sense of multiple ransactions over an extended period, the argument might be persuasive However, even in the cases when the firm does not want extended interaction or repeat patronage, it is not reed from the normative goal of viewing the customer relaionally Even relatively discrete transactions come with ocial, if not legal, contracts (often relatively extended) and implied, if not expressed, warranties They are promises and ssurances that the exchange relationship will yield valuable ervice provision, often for extended periods The contracts re at least partially represented by the offering firm's brand Part of the compensation for the service provision is the creation and accumulation of brand equity (an off-balance-sheet resource)

Customers also might not desire multiple discrete transactions, however, a customer is similarly not freed of relational participation Regardless of whether the service is provided interactively or indirectly by a tangible good, we argue that value is coproduced (FP$_6$), and in the case of all tangible goods, the customer must interact with them over some period that extends beyond the transaction Service provision and the cocreation of value imply that exchange is relational

In a service-centered model, humans both are at the center and are active participants in the exchange process What precedes and what follows the transaction as the firm engages in a relationship (short- or long-term) with customers is more important than the transaction itself Because a service-centered view is participatory and dynamic, service provision is maximized through an iterative learning process on the part of both the enterprise and the consumer The view necessarily assumes the existence of emergent relationships and evolving structure (e g , relational norms of exchange learned through reinforcement over time, see Heide and John 1992) The service-centered view is inherently both consumer-centric and relational

Discussion

Perhaps the central implication of a service-centered dominant logic is the general change in perspective The goods-centered view implies that the qualities of manufactured goods (e g , tangibility), the separation of production and consumption, standardization, and nonperishability are normative qualities (Zeithaml, Parasuraman, and Berry 1985) Thus, even many services marketers have taken up the implied challenge of trying to make services more like goods These qualities are primarily only true of goods when they are viewed from the manufacturer's perspective (e g , Beaven and Scotti 1990) From what we argue the marketing perspective should be, the qualities are often neither valid nor desirable That is, standardized goods, produced without consumer involvement and requiring physical distribution and inventory, not only add to marketing costs but also are often extremely perishable and nonresponsive to changing consumer needs

A service-centered view of exchange points in an opposing normative direction It implies that the goal is to customize offerings, to recognize that the consumer is always a coproducer, and to strive to maximize consumer involvement in the customization to better fit his or her needs It suggests that for many offerings, tangibility may be a limiting factor, one that increases costs and that may hinder marketability A service-centered perspective disposes of the limitations of thinking of marketing in terms of goods taken to the market, and it points to opportunities for expanding the market by assisting the consumer in the process of specialization and value creation

A service-centered view identifies operant resources, especially higher-order, core competences, as the key to obtaining competitive advantage It also implies that the resources must be developed and coordinated to provide (to serve) desired benefits for customers, either directly or indirectly It challenges marketing to become more than a functional area and to represent one of the firm's core competences, it challenges marketing to become the predominant organizational philosophy and to take the lead in initiating and coordinating a market-driven perspective for all core competences As Srivastava, Shervani, and Fahey (1999) suggest, marketing must play a critical role in ensuring that product development management, supply chain management, and customer relationship management processes are all customer-centric and market driven If firms focus on their core competences, they must establish resource networks and outsource necessary knowledge and skills to the network This means that firms must learn to be simultaneously competitive and collaborative (Day 1994), and they must learn to manage their network relationships

Ultimately, the most successful organizations might be those whose core competence is marketing and all its related market-sensing processes (Day 1999, Haeckel 1999) In a service-centered view of marketing, in which the purpose of the firm is not to make and sell (Haeckel 1999) units of output but to provide customized services to customers and other organizations, the role of manufacturing changes Investment in manufacturing technologies constrains market responsiveness Together with many goods becoming commodities, as evidenced by the rise in globalized, contract manufacturing services, firms will increasingly become more competitive by outsourcing the manufacturing function Achrol (1991, pp 88, 91) identifies "transorganizational firms," which he refers to as "marketing exchange" and "marketing coalition" companies, both of which have "one primary function—all aspects of marketing" Achrol suggests that "the true marketing era may be just over the horizon" Achrol and Kotler (1999) envision marketing as largely performing the role of a network integrator that develops skills in research, forecasting, pricing, distribution, advertising, and promotion, and they envision other network members as bringing other necessary skills to the network

In a service-centered view, tangible goods serve as appliances for service provision rather than ends in themselves In this perspective, firms may find opportunities to retain ownership of goods and simply charge a user fee (Hawken, Lovins, and Lovins 1999, Rifkin 2000), thus finding a competitive advantage by focusing on the total process of consumption and use For example, *chauffagistes* in France have realized that buyers do not want to buy furnaces and air conditioners and units of energy, but comfort, so they now contract to keep floor space at an agreed temperature range and an agreed cost They are paid for "warmth service," and they profit by finding innovative and efficient ways to provide these services rather than sell more products Similar examples are found in the United States, where Carrier is testing "comfort leasing" and Dow Chemical is providing "dissolving services" while maintaining the responsibility for disposing and recycling toxic chemicals Hawken, Lovins, and Lovins (1999, pp 125–27) cite these and other examples as indicative of the way firms benefit themselves, their customers, and society by increasing this "service flow," or the "continuous flow of value" as "defined by the customer" The observation of the market in terms of processes and service flows rather than units of output opens many strategic marketing opportunities

From a service-provision perspective, economic exchange in the marketplace has a competitor the potential customer (individual or organization) (Lusch, Brown, and Brunswick 1992, Prahalad and Ramaswamy 2000) The potential customer has a choice engage in self-service (e g , do-it-yourself activity) or go to the marketplace However, to be successful at self-service, the entity must have sufficient physical and mental skills and/or the appliances (embedded with knowledge) to make self-service possible Organizations that recognize this can find opportunities in developing offerings that enable the entity's increasing self-service

As individual people continue to progress toward finer degrees of specialization, they will find themselves increasingly dependent on the market, both for service provision and for the ability to self-serve Consequently, consumers will seek to domesticate or tame the market by adopting and developing a relationship with a limited number of organizations This domestication process increases the consumer's efficiency in dealing with the marketplace and decreases the impact of opportunistic behavior by potential service providers Consumers will develop relationships with organizations that can provide them with an entire host of related services over an extended period (Rifkin 2000) For example, in the providing for individual transportation, the automobile has associated needs for car insurance, maintenance, repair, and fuel There will be opportunities for organizations that can offer all these services bundled into periodic user fees The success of organizations in capitalizing on this need for domesticated market relationships does not come from finding ways to provide efficient, standardized solutions but from making it easier for consumers to acquire customized service solutions efficiently through involvement in the value-creation process

Achrol and Kotler (1999) extend this service perspective by suggesting that the marketing function may become a customer-consulting function The marketer would become the buying agent on a long-term, relational basis to source, evaluate, and purchase the skills (either as intangibles or embedded in tangible matter) that the customer needs, wants, or desires This could be extended to marketers who also serve as selling agents, enabling a customer to exchange his or her skills in the marketplace This position would enable the marketer not only to evaluate the skills (services) the customer needs but also to advise the customer about which skills (services) he or she can best specialize and exchange in the marketplace and the services (intangible or provided through goods) that might be acquired to leverage his or her own service provision and exchange processes

Historically, most communication with the market can be characterized as one-way, mass communication that flows from the offering firm to the market or to segments of markets A service-centered view of exchange suggests that individual customers increasingly specialize and turn to their domesticated market relationships for services outside of their own competences Therefore, promotion will need to become a communication process characterized by dialogue, asking and answering questions Prahalad and

Ramaswamy (2000) argue that consumers rather than corporations are increasingly initiating and controlling this diaogue Duncan and Moriarty (1998, p 3) believe that marketing theory and communications theory are at an ntersection, "[They are] in the midst of fundamental changes that are similar in origin, impact, and direction Parallel paradigm shifts move both fields from a functional, mechanistic, production-oriented model to a more humanisic, relationship-based model" They point out (p 2) that "many marketing roles, particularly in services, are fundamentally communications positions that take communicaion deeper into the core of marketing activities, which nvolves the process of listening, aligning, and matching" The normative goal should not be communication to the market but developing ongoing communication processes, or dialogues, with micromarkets and ideally markets of one

Shostack (1977) and others (e g , Beaven and Scotti 1990, Schlesinger and Heskett 1991) have indicated that the basic lexicon of marketing is derived from a goods-based, manufacturing exchange perspective As we believe, if conemporary marketing thought is evolving from an operand-resource-based, good-centered dominant logic to an operant-resource-based, service-centered dominant logic, academic marketing may need to rethink and revise some of he lexicon The seemingly diverse literature that we cite as converging on this new dominant logic provides the foundaion for the revised lexicon Notably, the need and its exisence do not necessarily require discarding the goods-centered counterpart Its function should be to refocus perspective through reorientation rather than reinvention For example, the treatment of quality in the services literaure has resulted in the distinction between manufactured quality and perceived quality, the former arguably has become a necessary but not sufficient component of the later The concept of transaction becoming subordinated to the concept of relationship is another example Similarly, Rust, Zeithaml, and Lemon (2000) have suggested that the customer-focused term "customer equity" be superordinated o the more traditional, product-focused term "brand equity," which is a component of the former (along with "value equity" and "retention equity")

Marketing educators and scholars should be proactive in eading industry toward a service-centered exchange model As with the lexicon, this implies reorientation rather than einvention This reorientation would not necessitate abandonment of most of the traditional core concepts, such as the marketing mix, target marketing, and market segmentation, but rather it would complement these with a framework based on the eight FPs we have discussed

A service-centered college curriculum would be grounded by a course in principles of marketing, which would subordinate goods to service provision, emphasizing he former as distribution mechanisms for the latter The marketing strategy course might be centered on resource advantage theory, building on the role of competences and capabilities in the coproduction of value and competitive advantage The course could be followed by a new course, one focused on the management of cross-functional businesses processes that support the development of the capabilities and competences needed in a market-driven organization Integrated marketing communication would continue to replace limited-focus, promotional courses such as advertising In addition, the course would emphasize both the means and the mechanisms for initiating and maintaining a continuing dialogue with the customer and for enhancing the relationship by using tools such as branding Likewise, the consumer behavior course might evolve to increased emphasis on relational phenomena such as brand identification, value perception, and the role of social and relational norms in coproduction and repeat patronage Similarly, courses in pricing would evolve to focus on strategies for building and maintaining value propositions, including the management of long-term customer equity The marketing channels course would become a course that addressed coordinating marketing networks and systems Supply chain management concepts would become subordinated to the management of value constellations and service flows

Complementing this college curriculum could be the emergence of executive education offerings with similar perspectives and frames of references It is perhaps in the executive education classroom where the rapid dissemination of the service-centered model of exchange is most likely

If adopted and diffused throughout industry, what does the service-centered model mean for the role of marketing in the firm? It positions service, the application of competences for the benefit of the consumer, as the core of the firm's mission Marketing's role as the facilitator of exchange becomes one of identifying and developing the core competences and positioning them as value propositions that offer potential competitive advantage To do this, marketing should lead the effort of designing and building cross-functional business processes Therefore, marketing should be positioned at the core of the firm's strategic planning Relationship building with customers becomes intrinsic not only to marketing but also to the enterprise as a whole All employees are identified as service providers, with the ultimate goal of satisfying the customer Everyone in the organization is encouraged to reflect on the firm's value proposition Indeed, from a service-centered dominant logic, a firm's mission statement should communicate the firm's overall value proposition

Finally, in the service-centered model, marketplace feedback not only is obtained directly from the customer but also is gauged by analyzing financial performance from exchange relationships to learn how to improve both firms' offering to customers and firm performance Marketing practice accepts responsibility for firm financial performance by taking responsibility for increasing the market value rather than the book value of the organization as it builds off-balance-sheet assets such as customer, brand, and network equity

Conclusion

The models on which much of the understanding of economics and marketing are based were largely developed during the nineteenth century, a time when the focus was on efficiencies in the production of tangible output, which was fundamental to the Industrial Revolution Given that focus, perhaps appropriately, the unit of analysis was the unit of output, or the product (good) The central role of the good also fits well with the political goals of exporting manufactured products to the developing and often colonized regions of the world in exchange for raw materials for the purpose of increasing national wealth In addition, making the good, characterized as "stuff" with embedded properties, the unit of analysis fits well with the academic goals of turning economics into a deterministic science such as Newtonian mechanics The goods-oriented, output-based model has enabled advances in the common understanding, and it has reached paradigm status

However, times have changed The focus is shifting away from tangibles and toward intangibles, such as skills, information, and knowledge, and toward interactivity and connectivity and ongoing relationships The orientation has shifted from the producer to the consumer The academic focus is shifting from the thing exchanged to one on the process of exchange Science has moved from a focus on mechanics to one on dynamics, evolutionary development, and the emergence of complex adaptive systems The appropriate unit of exchange is no longer the static and discrete tangible good

As more marketing scholars seem to be implying, the appropriate model for understanding marketing may not be one developed to understand the role of manufacturing in an economy, the microeconomic model, with its focus on the good that is only occasionally involved in exchange A more appropriate unit of exchange is perhaps the application of competences, or specialized human knowledge and skills, for and to the benefit of the receiver These operant resources are intangible, continuous, and dynamic We anticipate that the emerging service-centered dominant logic of marketing will have a substantial role in marketing thought It has the potential to replace the traditional goods-centered paradigm

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Invited Commentaries on “Evolving to a New Dominant Logic for Marketing”

In the preceding article, Vargo and Lusch (V&L, 2004) observe that an evolution is underway toward a new dominant logic for marketing The new dominant logic has important implications for marketing theory, practice, and pedagogy, as well as for general management and public policy Thus, their observations are likely to resonate with a broad cross-section of the business community With the goal of stimulating discussion and debate, I invited some distinguished scholars to write brief commentaries on different aspects of V&L's article I was delighted to receive a thoughtful and diverse set of comments The ideas expressed in the article and the commentaries will undoubtedly provoke a variety of reactions from readers of *Journal of Marketing* I hope you will enjoy reading, and thinking, about these scholars' views on the fundamental premises of marketing as much as I did

—Ruth N Bolton

Achieving Advantage with a New Dominant Logic

George S. Day

Dominant logics and disruptive technologies apparently evolve in the same way There is a convergence of streams of contributing technologies, methods, concepts, and theories that crystallize to form something new This is not an abrupt emergence, because the underlying elements change gradually Instead, there is usually a “tipping point” that signals and validates a seemingly radical shift For example, the key elements of wireless communications technologies were largely in place four decades before the “cellular revolution” took place

Vargo and Lusch (V&L) believe that we have passed the tipping point in the transition from a goods-centered to a service-centered logic for marketing My purpose is to apply a two-question stress test to their proposition First, what are the underlying reasons for this transition? If the enablers have endurance, this new dominant logic will likely be sustained and advanced Second, will it change our view of how marketing resources are converted into competitive advantage? If a service-centered logic prevails, this logic should fundamentally change the mind-sets, schemas, and mental models of the managers and researchers who determine how competitive advantage is conceptualized and how resources are allocated (Bettis and Prahalad 1995, Prahalad and Bettis 1986)

Enabling a New Dominant Logic

Many tributaries feed the “new” dominant logic, including services marketing, market orientation, customer relationship management, networked markets, mass customization, and interactivity Each tributary has been a high-profile part of the marketing terrain for at least a decade Why have they converged now? A common denominator is that each draws on information technology advances that enable universal access to knowledge that previously was dispersed and difficult to reach The drivers are the acceptance of compatibility standards that enable computer systems to converse as well as the escalation of broadband communications and economical computing power

This connected knowledge system enables the real-time coordination of dispersed organizational activities and groups, the management of cross-functional processes, and the synchronization of the myriad points of customer contact that are integral to the new dominant logic However, most firms are far from capitalizing on the possibilities, which means that marketing is still in the early stages of the transition to a service-centered dominant logic Indeed, the tipping-point argument readily leads to the conclusion that the rate of transition is likely to accelerate By facilitating information flows, and the concomitant knowledge sharing and utilization, the enablers will also speed acceptance of the premise that “knowledge is the fundamental source of competitive advantage” (V&L, p 9) This raises the question of who will be advantaged or disadvantaged as the competitive landscape changes

Competing When the Dominant Logic Changes

The crux of V&L's argument (p 12) is that a service perspective is superior to a goods-centered view because it emphasizes solutions and “points to opportunities for expanding the market by assisting the consumer in the process of specialization and value creation” This is not a new insight Fully 63% of the *Fortune* 100 firms already claim that they offer solutions (Sharma, Lucier, and Molloy 2002), but have these firms really encoded the concept of solutions in their dominant logic, or is it merely a fashionable statement of intent?

It is unlikely that most firms are pursuing a true solutions strategy as V&L advocate This would mean satisfying the following five criteria for a deep relationship that transfers a supplier's skills and knowledge to a customer that lacks them First, the strategy requires the *integration* of products with services to offer a complete bundle of benefits Second, there is a two-way *interaction* that results in mutual commitments, ranging from information exchanges to cross-firm coordination and even relation-specific investments This implies the third and fourth criteria The solu-

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tion is *coproduced* by the customer and supplier, and it is *tailored* to each customer Fifth, the solution might also mean some absorption of the *customer's risk* In light of these stringent criteria, arm's-length referrals, one-stop shopping, and even a tailor-made personal computer that suits a customer's desired configuration do not qualify as service-centered solutions

An important caution is that many customers may willingly enter into only a few close and committed relationships They may resist the kind of operational entanglements based on relationship-specific assets that create switching costs (Dyer and Singh 1998), such as (1) location of assets in close proximity, (2) tailoring of physical assets, or (3) human-asset specificity achieved through cospecialization and shared knowledge For example, GE Plastics installs sensors in customers' injection-molder storage silos to signal an automatic recorder when volume becomes low It takes a lot of iterative learning to make this work, which underscores the participatory and dynamic nature of the new dominant logic However, not every customer may want to subordinate its ability to bargain with suppliers or expose itself to the risk of a single source Thus, both a product- and a service-centered logic will coexist in most markets

Achieving a Relational Advantage

The emphasis on operant resources in the new dominant logic is well grounded in the resource-based view of the firm The immediate implication of this theory is that many firms will find it hard to gain and sustain a relational advantage through superior solutions

A key premise of the resource-based view is that resource and capability development is a selective and path-dependent process The need for selectivity requires an organization to concentrate attention on a few capabilities that correspond to key success factors in the target market Thus, firms need to select whether to make superior relational value a central or a supportive element of their strategy Many firms will not make this choice, perhaps because they have been preempted

Firms build on what they know (Cohen and Levinthal 1990) As a result, they are path dependent when choosing which resources to develop Behind the immediate choices are histories of prior choices that sensitize the firms to certain issues, create a knowledge platform on which they can keep building, and constrain or lock in the firm to a particular path

The choice of a new strategic direction derived from the new dominant logic must overcome the inertia of this path dependency However, an entrenched logic that is built into the mind-set and mental models of managers is difficult to change The old logic must be unlearned (Bettis and Prahalad 1995) This can be a slow process because the prevailing dominant logic both supports and is reinforced by the current strategy and structure Overcoming this inertia takes leadership and resource commitments sustained by a sense of urgency because of the threat of new or existing competitors that are better aligned with changing customer requirements

Further motivation for change comes from the prospect of firms not being able to overcome the disadvantage of a follower According to the sustainability premise of the resource-based view, key resources keep their value when they are protected from imitation by causal ambiguity There is causal ambiguity when it is unclear to competitors how the source of advantage works Causal ambiguity deepens when the resource is based on a complex pattern of coordination in a process The complexities of a solutions strategy enabled by the new dominant logic will be difficult to master but even more difficult to copy

What Role for Marketing?

The emerging dominant logic has many implications, but they are not entirely the ones that V&L have in mind Vargo and Lusch believe that marketing should be at the center of the integration and coordination of the cross-functional processes of a service-centered business model, but this depends on what is meant by "marketing" It will probably not be the marketing function that is found in most firms, instead, it will be marketing as a general management responsibility of the top team that will have the crucial tasks of (1) navigating through effective market-sensing, (2) articulating the new value proposition, and (3) orchestrating by providing the essential glue that ensures a coherent whole This broadened role is most effective in a market-driven organization that has superior skills in understanding, attracting, and keeping valuable customers (Day 1999) Thus, the field converges toward and thereby validates V&L's conclusion that the new dominant logic is inherently customer centered and market driven

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Stories and Theories

John Deighton & Das Narayandas

Stories can be read as illustrations of theory This commentary can be read in that spirit, as a story that attempts to vivify what V&L contend is the new dominant logic of marketing Stories can also be read as challenges to theory, and perhaps some readers will interpret this commentary in that spirit Either way, telling stories, whose verisimilitude is the primary "fact" that theory is called to account for, is not how marketing literature usually operates However, telling stories is a tradition in anthropology, history, and some of the other interpretive social sciences, and if V&L are correct that marketing scholarship must increasingly contend with value not frozen in objects but flowing in events, then, as anthropologists and historians do, marketing scholars may find that offering stories to one another to support or repudiate claims about the meaning of a sequence of events is a useful way to perform scholarship

This story, or history, is of two companies A comparison of their fates over five years may illuminate what V&L describe as the new dominant logic for marketing In 1993, SaleSoft was founded in Cleveland to serve the market for sales force automation (SA) software Siebel Systems was founded in San Mateo, Calif , in the same year and for the same purpose In 1995, a Gartner Group (1995) report pictured the two as close contenders in the race for market leadership, but by 1997, one was out of business and the other's market capitalization was $2 billion. Can this stark divergence in outcomes be considered evidence weighing on the assertion that what V&L call a "units-of-output" marketing perspective is inferior to a service-flows perspective? Can it be that pathfinding framed within the latter paradigm was bound to be more successful than if framed within the former?

In 1995, SA software represented a $1 billion market. It was used by a quarter of all firms that employed sales forces, including most *Fortune* 1000 corporations. However, most firms used quite simple contact management software that kept track of a salesperson's itinerary and transmitted progress to headquarters daily or weekly. The opportunity that SaleSoft and Siebel set out to pursue was larger: to automate the sales process and integrate it with marketing and customer service to create a system that, both firms claimed, would unify the fragmentation that characterized sales and marketing, just as manufacturing resource planning had brought order to the production side of the enterprise. In 1995, SaleSoft had built three of eight modules needed to realize this vision and had installations at only five customer sites. Siebel had no complete product and a small set of customers.

SaleSoft (as Narayandas [1998] describes) framed its problem in what might be called "units-of-output" terms. It decided that the difficulty in finding customers pointed to a problem with the product. It believed that its integrated sales, marketing, and service automation offering was too complex, that its sales cycle was too long, that too many people were involved in the purchase decision (several customer business units as well as systems integrators and consultants), and that too much customization was required in each installation. The answer, management concluded, was a simple order-pipeline management product with a crisp value proposition for a single organizational decision maker (the head of sales in the customer firm) that would need no customization by systems integrators. Sales of the simpler product would be a Trojan horse, leading to sales of the multimodule system in due course. SaleSoft projected that it would sell product to a value of $30 million in three years, which would represent 1.3% of the market.

Siebel (as described in the works of O'Reilly and Chang [2001] and Roberts, Lassiter, and Tempest [1998]) framed the problem in what might be called "service-flow" terms. It identified a few large-potential firms that might appreciate what information technology would eventually do for their enterprises. Phase 1 of the service flow was to collect information about the firms' business processes and to propose how the processes might be enabled by information technology. For the firms that respected the expense and complexity of realizing the opportunity and preferred to fund others to do it rather than undertake it themselves, Siebel supplied services to map the processes into code, build systems, and train people to implement the coded systems. Siebel outsourced about 70% of service revenue to systems integrators. It then invited some of the clients and one of the systems integrators to become shareholders. It held out to these investors the vision of a market worth more than $2 billion. When the value-creation process involves coproduction between vendor and client, the marker of a successful collaboration is customer satisfaction, and the measure of satisfaction is continuity of the relationship, as V&L note. That said, transaction revenue is also pleasing evidence of success, and within three years, annual revenue from the shareholders and other clients was $397 million, or 13 times the target glimpsed in SaleSoft's units-of-output framing of the path ahead.

Several features of the successful case that are absent from the failure case are elements of V&L's new dominant logic. In the successful case, the customer was a coproducer, to the point in some cases of being an investor. The company framed the offering as a flow of services, beginning with an interactive definition of the customer's problem and leading to joint development of a solution. Indeed, the head of a competitor once described Siebel's approach as "the client's people, the client's processes, Siebel's tools, so two-thirds of the risk and responsibility was in the client's hands" (personal communication, September 2001). By co-opting the customer throughout the design and implementation of its systems, by holding the customer responsible for making the product work successfully, and by enabling the customer and the integrators to share in the marketplace success, Siebel outran SaleSoft.

Does this story of two responses to the same market conditions support V&L's argument, or does it, on the contrary, hint that the argument fits only particular contingencies, such as the moment when a market is emerging or when the client truly wants a service, not a product? Is there a new dominant logic for marketing or just a familiar set of contingencies? We do not know the answer, and if we did, we doubt that we could be convincing within the word limit imposed on this commentary. However, we do assert that the answer lies in the inductive development of theory from phenomena closely observed and thickly described. Writing of the early history of thermodynamics, Lord Kelvin said that the steam engine had given more to science than science had given to the steam engine. In the same spirit, we suggest that at this point in marketing's evolution, perhaps the marketplace has more to teach scholars than scholars have to teach the marketplace.

Service Provision Calls for Partners Instead of Parties

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Evert Gummesson

Vargo and Lusch's intent to develop new marketing theory based on research and market changes of the past few decades and to offer links back to Adam Smith, Wroe Alderson, and others has my full support. There is little integrative marketing theory on a higher level of abstraction and generalization, but there is no shortage of fragmented "textbook theory" that piles ideas, concepts, models, survey data, cases, and hypotheses on top of one another.

My task is to comment on three of eight foundational premises of a new logic of marketing in which service provision is the unifying concept. The three are (1) "The application of specialized skills and knowledge is the fundamental unit of exchange," (2) "Indirect exchange masks the fundamental unit of exchange," and (3) "Goods are distribution mechanisms for service provision." Because I agree, in essence, with the authors, I reflect on some of their issues.

In the spirit of grounded theory (Glaser 2001), collection, analysis, and interpretation of data are targeted to finding a hierarchy of variables, categories, and concepts that results in progressively more general theories. I have ventured to find a core variable that unifies the first three premises, and I have settled for "provider." Rather than claiming that this choice is the best, the stance in grounded theory is investigating where a tentative variable leads and constantly being open to revision.

"Provider" embraces experts, organizations, and goods, each representing one of V&L's three premises. Consumers have moved from self-supporting individuals in local and familiar environments to become dependent on experts, strangers, and external products. Providers stand between consumers and need-satisfaction. Traditional literature offers clear-cut roles and parties: seller/buyer, active producer/passive consumer, and subject/object. For example, physicians provide expert advice and patients receive it ("doctor's orders"), retailers distribute household appliances to consumers, and a washing machine cleans dirty laundry for its owner.

Service research began to realize that these parties, roles, and activities were inseparable and simultaneous, at least in part. Production and consumption were not tied to clearly defined parties, but roles became blurred, and there was a third activity: *interaction*. The consequence is that service and value are produced through (1) independent provider contributions, (2) independent customer contributions, and (3) joint contributions through interaction.

In this light, the physician provides expertise in certain therapies, but patients are experts of their own experience of a disorder. To arrive at a superior solution, doctors need interaction with patients, and patients must not only consume the therapies but also produce them by taking medication, exercising, and altering their lifestyles. Patients may even know more about a disease than the doctor does, the reason being that doctors know little about health, disease, and cure relative to what there is to know. The patients' possibilities of being updated on a disorder through the Internet have highlighted this even more. This way of reasoning supports the relationship marketing view, in which providers and customers retain win–win relationships. The *parties* become *partners*.

How is it in marketing practice and theory? Marketing scholars have not been successful in generalizing this knowledge into actionable theories, even if the Internet has speeded up the interest in interaction. The bulk of relationship marketing and customer relationship management literature reflects the 4P's of marketing management, a traditional perspective in which the role of the firm is to manipulate, manage, and lock in the customer (Gronroos 2000; Gummesson 2002a, b).

The alleged superiority of specialization, large-scale operations, and standardization in boosting productivity worries me, especially when it comes to food. Consumers have lost touch with original food, and little is left of its origin after heavy processing by food technology, genetic manipulation, packaging, transport, storage, and sales to households, which often continue the processing with "kitchen technology." Channel management takes the product for given and is solely concerned with the productivity of the steps in an alleged value chain. Product and operations management knowledge are lacking in marketing, even though it is claimed that both services and goods are in part coproduced and that marketing and production are often simultaneous. What, then, are the net productivity gains when consumer and societal value is considered? Corporations become more productive, but food quality (measured in terms of its core mission to provide nutrition and health) becomes inadequate, thereby causing obesity, diabetes, and a host of other nonquality effects.

Experts, organizations, and goods increasingly depend on sophisticated technology, though it may be most obvious with goods. Technology is axiomatically hailed as good, even as "God." At least initially, technology is science- and producer-centric; it is rarely customer-centric. For example, there is much anecdotal evidence that information technology (IT) has both boosted productivity and increased quality of life. A *Harvard Business Review* article (Carr 2003) says to the contrary, which caused *Fortune* (Kirkpatrick 2003) to react vehemently in defense of IT. A study by McKinsey, reported in the media in 2001, concluded that there was no evidence that IT had improved productivity in general (though it might have in specific cases). In a letter, Peter Drucker (2002) expressed his concern: "I have yet to see a company that has really succeeded in integrating information technology into its management structure and into its decision making." For example, it has been observed how relationship marketing principles, transformed into customer relationship management software (eCRM), partially get lost by the neglect of human aspects (hCRM).

Where are the hard facts and metrics, saluted by marketing scholars and managers alike, to prove the net benefits of the providers to the customer, when, for example, food marketing and IT marketing are concerned? Piecemeal surveys of limited data and based on arbitrary assumptions and narrow operationalizations of variables are not sufficient. To begin with, marketers need to do as V&L advocate: reinvent marketing theory to fit the present and the future. The more marketers dare to recognize the complexity and ambiguity of marketing phenomena in this theory, the more useful it will be.

On the Service-Centered Dominant Logic for Marketing

Shelby D. Hunt

Vargo and Lusch argue that marketing, informed by static-equilibrium economics, has had a goods-centered, "value is embedded in output," dominant logic. However, V&L argue that marketing is now evolving toward a dynamic, evolutionary-process, service-centered

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view that is informed by resource-advantage theory, competences, knowledge, and relationship marketing In this view, "value is defined by and cocreated with the consumer" (p 6) For V&L, marketing *should* shift toward this customer-centric, market-driven, service-centered view, and it should (1) focus on specialized skills and knowledge as operant resources that provide competitive advantage, (2) strive to maximize consumers' involvement in developing customized offerings, and (3) aim to be "the predominant organizational philosophy [that] lead[s] in initiating and coordinating a market-driven perspective for all core competences" (p 13) Furthermore, marketing scholars should "lead industry toward a service-centered model of exchange," teach principles courses that subordinate "goods to service provision," and teach marketing strategy courses that center on resource-advantage theory (p 14)

A decade ago, Robert M Morgan and I struggled to craft an article-length (rather than monograph-length) manuscript that would articulate a new theory of competition (Hunt and Morgan 1995) Similarly, V&L's goal of developing an article-length manuscript on marketing's evolving logic dictated that they could not explore in depth all the worthwhile topics Therefore, this commentary does not nitpick their argument but, at the editor's suggestion, amplifies and extends it, using the resource-advantage theory on which V&L draw

Central to V&L's argument, and unique to their work, is the distinction between operand resources (those on which an operation or act is performed) and operant resources (those that act on other resources) However, precisely what is a "resource"? For resource-advantage theory, resources are the "tangible and intangible entities available to the firm that enable it to produce efficiently and/or effectively a market offering that has value for some market segment(s)," and resources are categorized as financial, physical, legal, human, organizational, informational, and relational (Hunt 2000, p 138) Therefore, resource-advantage theory both conceptualizes "resource" and explicates the kinds of resources that can be operand or operant That is, operand resources are typically physical (e g , machinery, raw materials), whereas operant resources are typically human (e g , the skills and knowledge of individual employees), organizational (e g , controls, routines, cultures, competences), informational (e g , knowledge about market segments, competitors, and technology), and relational (e g , relationships with competitors, suppliers, and customers)

For V&L, the "consumer must understand that the value potential [of an offering] is translatable to specific needs through coproduction The enterprise can only make value propositions that strive to be better or more compelling than those of competitors" (p 11) As to what this means, recall resource-advantage theory's nine-celled, competitive-position matrix, the axes of which are relative resource-produced value and relative resource costs (Hunt 2000, p 137) Because "value refers to the sum total of all benefits that consumers perceive they will receive if they accept a particular firm's market offering" (Hunt 2000, p 138), the positions of competitive advantage/disadvantage in the matrix further explicate V&L's emphasis on value propositions that are more compelling

For V&L, operant resources such as competences are valuable to the firm How, though, is their value determined? For resource-advantage theory, not all resources that are valuable to the firm have an exchange value or price, that is, relatively immobile resources, such as competences, are not commonly or easily bought and sold in the marketplace (save when firms themselves are bought and sold) Therefore, the value of such operant resources is determined not by exchange but by the extent to which each resource contributes to the firm's ability to produce efficiently/effectively market offerings that some market segments perceive as having value In addition, because relative resource costs in the competitive-position matrix are accounting costs, they may be related only indirectly to key, operant, value-producing resources

For V&L, competition is a knowledge-discovery process because "in the service-centered model, marketplace feedback not only is obtained directly from the customer but also is gauged by analyzing financial performance from exchange relationships to learn" (p 14) For resource-advantage theory, competition is a disequilibrating process that involves the constant struggle among firms for comparative advantages in resources that will yield marketplace positions of competitive advantage and, thereby, superior financial performance In this process, "firms learn through competition as a result of feedback from relative financial performance 'signaling' relative market position, which, in turn, signals relative resources" (Hunt 2000, p 136) Therefore, to amplify V&L's insight, "[b]ecause command economies lack the process of competition, their firms lack a powerful means (i e , financial performance stemming from marketplace positions) for determining how efficient and effective they are Indeed, it was the premium prices of Western imports that communicated to socialist planners just how ineffective socialist firms were" (Hunt 2000, p 174)

For V&L, marketing strategy should be taught from the view of resource-advantage theory Missing are the arguments for "why" and "how" The arguments are found in Chapter 9 of *Foundations of Marketing Theory* (Hunt 2002), where resource-advantage theory is argued to be *toward* a general theory of marketing on three grounds, one of which is that it provides a positive foundation for normative theories, such as those strategies based on market segmentation, resources, skills, knowledge, learning, competences, market orientation, and relationships Faculty and students report that resource-advantage theory provides a model that enriches the educational experience by integrating the remarkably diverse topics taught in business and marketing strategy To understand competition (i e , resource-advantage competition) is to make sense of strategy

In conclusion, as bespeaks an important and potentially seminal article, V&L's argument is historically informed, finely crafted, properly interdisciplinary, and logically sound Their position deserves a careful read and thoughtful evaluation, not a quick skim and hasty judgment I urge marketers to provide such an evaluation Competition is an evolutionary, disequilibrating, dynamic process that involves firms that use operand and operant resources in their search for competitive advantages and superior financial performance As it is in competition, so it should be in marketing

The Cocreation of Value

C.K. Prahalad

I have been asked to comment on V&L's sixth foundational premise The customer is always a coproducer I want to congratulate the authors on challenging the dominant logic for marketing by suggesting that services ought to be at the core, and therefore consumers become coproducers My concern is that V&L do not go far enough I would like to take a step back and identify the attempts by various scholars to recognize the patterns of customer involvement and engagement in the value-creation process Then, I would like to illustrate that as scholars, we are behind the reality of how customers engage themselves in the value-creation process

What is meant by customers as coproducers? There are multiple approaches to customer engagement (Berry and Parasuraman 1991, Heskett, Sasser, and Schlesinger 2002, La Salle and Britton 2002, Peppers and Rogers 1993, Pine and Gilmour 1999, Rust, Zahorik, and Keiningham 1996, Schmitt 1999, Thomke 2003, Zeithaml 1990) First, firms try to persuade customers through advertising and promotions, they try to engage them emotionally, if not physically, in the act of coproduction The second phase of customer involvement is self-service (e g , self-service gas stations, self-checkout in grocery stores), which is a transfer of work from the firm to the customer In that sense, the customer is a coproducer The third phase is the staging of an experience in which the firm constructs the context and the consumer is part of it (e g , Disney World) The consumer is involved and engaged, but the context is firm driven This is labeled the "experience economy" The fourth phase is to allow the customer to navigate his or her way through the firm's system to solve a problem (e g , call centers) Call centers may provide 24-hour service, but their success depends on both the skill levels and the persistence of customers, this involves transfer of work, use of the customer's time, and use of the customer's skills The fifth phase is in consumers getting involved in codesigning and coproducing products and services Consumers have work, service, and risks transferred from the firm, and both the consumer and the firm benefit Risk can be lowered for both the firm and the customer There are two common features in all five perspectives on customer engagement and involvement Although work and risks increasingly are shared, the firm decides how it will engage the customer It is this premise, a firm-centered perspective on how to engage the customer, that needs to be debated

Although the aforementioned approaches to customer engagement and involvement are current, there are indications that customers want to engage with the firm in new ways Three forces are driving this transformation (1) ubiquitous connectivity that enables consumers to be well informed and networked, (2) convergence of technologies (and especially the emergence of digital technologies), and (3) globalization of information Four implications result from these drivers

1 Customers are not isolated The firm–customer relationship is not bilateral Customers, customer communities, and firms interact Customer communities can be an integral part of the value-creation process, whether by developing product strategy (e g , video games) or new distribution channels (e g , Napster and now Kazaa)
2 The outcome of the engagements (be it a single customer with the firm or the customer community and the firm) is the cocreation of value, what is cocreated is the experience Physical products and services can be the artifacts around which personalized experiences are cocreated
3 New building blocks are needed for the cocreation of value The new building blocks are dialogue (rather than one-way communication from the firm to the customer), access and transparency to information (to avoid and eliminate the asymmetry of information between the firm and the consumer), and risk assessment (an explicit dialogue among consumers, consumer communities, and the firm of risks)
4 No single firm can provide the total cocreation experience Often, a network of firms must work together to provide a unique cocreation experience (e g , OnStar)

The central ideas revolve around the individual consumer, the experience, the cocreation of value, the criticality of consumer communities, and the need for a network of firms My colleague Venkat Ramaswamy and I have been working on these ideas for more than four years (Prahalad and Ramaswamy 2000, 2002, 2003, 2004) We find that when we escape the firm and product-/service-centric view of value creation, which is the dominant logic for marketing and strategy (see Kotler 2002, Porter 1980), and move on to an experience-centric cocreation view, new and exciting opportunities unfold This new perspective also enables us to challenge the deeply held assumptions about marketing staples, such as the meaning of a brand (experience is the brand), the role of exchange and the market (market as a forum), and innovation (innovating experience environments) This is not the place to detail these implications I want to congratulate *Journal of Marketing* for opening up this debate Marketing scholars need more of the "let us examine our premises" perspective in scholarly work for the field to catch up with and shape *next* practices

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If Everything Is Service, Why Is This Happening Now, and What Difference Does It Make?

Roland T. Rust

I am delighted to respond to V&L's brilliantly insightful article They do a thorough job of detailing the evolution of marketing thought and demonstrating that marketing is currently in the process of perhaps its most profound paradigm shift I would first like to expand on their work by providing a historical insight into why this paradigm shift is happening now, rather than, for example, 100 years ago Second, I wish to explore further some of the implications that this paradigm shift has for marketing academia and marketing practice

The innate intelligence of *Homo sapiens* has not changed much in the past 100,000 years, so it is unlikely that the marketers, economists, and philosophers of today are significantly more intelligent than those of 100, 200, or 300 years ago The implication is that new paradigms are more likely to result from structural changes in the underlying system than from increasing perceptiveness and insight Perceptiveness and insight *are* required to sense the structural changes and understand their importance, but it is the structural changes that provide the underlying basis for new paradigms

Why, then, are scholars only now realizing the full implications of the notion that everything is service? It seems to me that the answer to this question pertains to information technology As V&L so capably point out, it is ultimately knowledge and information that drive service It is no coincidence, then, that the information revolution that has accelerated in the past 100 years has brought with it a revolutionary new capability to leverage knowledge and information into service In particular, it has expanded the intangible aspect of virtually all economic exchanges

In essence, the service revolution and the information revolution are two sides of the same coin Information technology gives the company the ability to learn and to store more information about the customer, which in turn gives the company more ability to customize its services and to develop customer relationships The result is that the utility provided to the customer increasingly is based more on information and less on physical benefits

Consider the example of General Motors, a traditional bastion of the goods economy, which for many years derived its profits almost exclusively from selling cars and other vehicles However, as the information economy developed, the provision of service and the manipulation of information became increasingly important, to the extent that eventually the General Motors Acceptance Corporation (the car-loan subsidiary of GM) became even more profitable than the core car-sales part of the company For similar reasons, IBM shifted from being primarily a computer manufacturer to being primarily a service and consulting company, and American Airlines found that its SABRE reservations company was even more profitable than its airliners Even large oil companies such as ExxonMobil have realized that their competitive advantages derive more from service elements, such as the Speedpass payment system, than from gasoline

If it is acknowledged that information technology is the driver of the shift toward service, it is also possible to forecast the future of marketing confidently Information technology has always moved forward, in a trend that has now lasted for thousands of years Thus, it can be confidently predicted that information technology will continue to advance This, in turn, implies that marketing's paradigm shift toward service will only intensify The past 100 years provide unambiguous confirmation of this conclusion As information technology has accelerated, the world's leading economies have changed from approximately 30% service to approximately 70% service

What, then, are some of the implications of this paradigm shift for marketing academia and marketing practice? Many existing concepts and models will need to be modified For example, traditional marketing relies on many technologies (e g , conjoint analysis or discrete choice models) that implicitly assume a transactional choice Such models were used, for example, to predict (wrongly) that New Coke would be much more popular than the original Coke As marketing proceeds toward more of a service/relationship paradigm, transactional choice models are increasingly incomplete and need to be replaced by models of choice in the context of a relationship The brand choice models failed to model the effect of customers' relationship with the original Coca-Cola brand Such relationships occur with even more frequency and intensity in the service economy Ultimately, it must be realized that it is the lifetime value of the customer relationship that really matters to the marketer and that the transactions in that relationship are driven not only by traditional conjoint choice elements, such as value and brand, but also by relationship elements, involving switching costs, that change and evolve over the course of the relationship

Some sectors of the economy lead in this paradigm shift Business-to-business marketing has originated many of the most important new ideas in marketing, due to its relationship intensiveness and its customer databases Likewise, the service sector has experienced the embrace of its underlying concepts (e g , customer satisfaction, customer loyalty, customer equity) by an increasing percentage of the marketing world Predictably, the slowest adopters of the new paradigm are consumer packaged-goods companies, but even there the information/service revolution is inexorably transforming the way that marketing is conducted Increasingly, customer panel databases are used to understand the dynamics of customer relationships, and information technology provides the capability for statistical techniques that make it possible to personalize marketing efforts

Marketing is entering a new era, and mainstream marketing in the new era will closely resemble the business-to-business/service/relationship marketing of today The reason for the shift is the advance of information technology, which has resulted in the service revolution and the use of information to understand and enhance customer relationships Marketers need to replace their goods-derived transactional concepts and models with service-derived relationship concepts and models For the foreseeable future, the service/information parts of every business will continue to increase in importance because of inevitable advances in information technology, and the marketing paradigm as V&L describe will become even more dominant as time passes

Finance, Operations, and Marketing Conflicts in Service Firms

Steven M. Shugan

The insightful observations of V&L should dramatically influence academic research in marketing and other disciplines Vargo and Lusch eloquently and provocatively detail why the mainstream marketing discipline must react to obvious dramatic changes in the world economy It must be recognized that (1) the service sector dominates most developed economies in the world and employs nearly all marketing students, (2) the systems that deliver manufactured products (i e , service) often provide more value-added for the customer than do the delivered manufactured products themselves, (3) managing company–consumer service interactions requires adaptation, dynamic strategies, and learning new competences, and, consequently, (4) marketing research requires reinvention

The spirit of V&L is undeniable As service-dominated economies replace manufacturing-dominated economies, most transactions involve government, high-end business services, health care (e g , Kahn and Luce 2003), legal services, transportation services, evolving communications, multichannel retailing, financial services, and personal services

Three questions emerge, the answers to which might dictate the station, and perhaps survival, of the marketing discipline Although survival seems a hyperbole, consider the following First, stagnant consumer packaged-goods manufacturers rather than lucrative financial services or rapidly expanding business services predominantly employ marketing's best students Second, although top corporate officers of consumer packaged-goods firms often have marketing pedigrees, other backgrounds (e g , finance, law, operations) prevail for most service firms (Doyle 2000, Fredman 2003, Pasa and Shugan 1996) Third, although new marketing faculty members enjoy increased starting salaries this year, their salaries still lag those of hires in information systems, operations, accounting, and finance (AACSB 2002–2003 Salary Survey) Fourth, the gap between academic research and the content of basic marketing textbooks is growing Fifth, knowledge of the marketing literature is less of a competitive advantage for marketing doctoral students who face competition from nonmarketing doctoral students

What Are the Risks of Doing Research with a Service Orientation?

Many authors (e g , V&L) justifiably advocate implementing radical new research directions, but nontrivial impediments and perilous obstacles await researchers First, much of the marketing discipline concerns itself with developing and refining tools for analyzing numeric data, which historically have been cross-sectional survey data These data endowed marketing groups with unique advantages having valuable information not available elsewhere in the organization and having homegrown techniques with which to analyze it A shift to longitudinal transaction data makes the techniques less valuable Moreover, longitudinal transaction data are well understood by finance, operations (e g , the airlines), accounting, information systems, and other business disciplines, which have analyzed the transaction data for years and have developed their own decision-making tools that employ that data The marketing discipline's distinctive competency in this domain is unclear

Second, generality is a traditional holy grail of academic research The developers and zealous stewards of existing methods and theories will enthusiastically proclaim that new methods are unnecessary Their current treasured methods are equally applicable to data on soap sales or data on surgery

Third, services (as defined by the U S Census Bureau) possess neither entirely unique nor mutually common properties For example, although psychiatric services are intangible, setting broken bones is no less tangible than the scent of manufactured perfumes Although consulting services require clients, airplanes fly without passengers Although inventorying empty airline seats after departure is difficult, many manufactured goods are also highly perishable Although dry-cleaning services require some customer participation, driving manufactured automobiles requires greater degrees of customer involvement

Is the Marketing Function Important to Service-Oriented Firms?

Marketing is certainly an essential activity that is worthy of serious academic research However, for service industries, other disciplines make compelling claims to greater relevancy In the airline industry, marketing might take a backseat (no pun intended) to maintenance- and safety-related functions For many public utilities (e g , electricity, water, emergency services), marketing might take a backseat to legal concerns and regulatory obligations Do pilots require a customer orientation or flight training? Are restaurant servers more important than the quality of meals? Do deficiencies in marketing or operations explain the high rate of bankruptcies among service providers? Was the titanic battle between Kmart and Wal-Mart resolved on the operations battlefield or on the marketing battlefield (Muller 2002)?

The fundamental marketing concept of a customer orientation can be vague For example, who is the customer of a hospital? Is it the patient who receives the service, the insurer who pays for the service, the admitting physician who refers the patient, the government regulator who specifies the service, or the employer who chooses the health-care provider? Are the customers of colleges the students, the parents who pay the tuition, the taxpayers who provide subsidies, the donors who provide funding, the corporations who hire the students, the grant providers, the government, or society at large?

Despite the significant role of marketing, modesty is appropriate Marketing must coexist with finance and operations Researchers in marketing must recognize and contemplate the impact of marketing activities on operations as well as their financial impact For example, complex or confusing promotions might tax servers, thereby causing a dramatic detrimental impact on server time per customer Moreover, marketing must be accountable to finance and justify marketing activities by measuring both customer satisfaction and the consumption of precious organizational resources For example, it must be considered how marketing activities affect scarce resources (e g , server time, space, administrator attention) during times of peak capacity

What Service-Related Research Problems Crave Attention?

Rather than directly attacking existing views as simply inadequate (despite justification) or arguing for the universal dominance of the marketing function, perhaps a more humble approach is possible Scholars might focus on overcoming concrete problems and daily challenges commonly faced by particular service industries (Shugan 2003) The primary concern is the implementation of marketing activities, including their financial impact (e g , Rust, Moorman, and Dickson 2002) and impact on operations (e g , Evangelist 2002)

As extensions of prior work, further research should explore the following challenges

- •Implementing marketing strategy in an operations-dominated environment (e g , Eliashberg et al 2001),
- •Measuring the impact of marketing strategies on short- and long-term profits (e g , Leeflang and Wittink 2000),
- •Managing demand and enhancing profits, given capacity constraints,
- •Developing new services in which implementation is more critical than design,
- •Developing recovery systems for mitigating almost-certain failures in service delivery systems (e g , Hart, Heskett, and Sasser 1990),
- •Making personal selling more effective by adding service,
- •Developing marketing strategies for exploiting seasonality and diminishing its deleterious impact on server capacity (e g , Radas and Shugan 1998),
- •Increasing sales and profits when teams deliver the service,
- •Marketing when third parties pay for the service or evaluate it (Eliashberg and Shugan 1997),
- •Using marketing to train effectively and to retain employees,
- •Marketing more effectively information services, entertainment, and services with low marginal costs,
- •Developing highly profitable ancillary services to complement low-margin core services (e g , concessions at movie theaters),
- •Balancing self-service and employee-delivered service,
- •Determining the optimal amount of customization (e g , Anderson, Fornell, and Rust 1997) in a rate-based pricing environment,
- •Developing internal marketing programs to motivate service employees,
- •Determining when and how to advance sell services (Moe and Fader 2002, Xie and Shugan 2001),
- •Developing creative pricing ideas for services (e g , Biyalogorsky and Gerstner 2004),
- •Building network externalities for services (e g , Basu, Mazumdar, and Raj 2003), and
- •Measuring the impact of more service on customer welfare (e g , Liu, Putler, and Weinberg 2004)

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Allan D. Shocker, Barry L. Bayus, & Namwoon Kim

Product Complements and Substitutes in the Real World: The Relevance of "Other Products"

In the real world, buyer demand for a product can depend directly and indirectly on the marketing efforts of "other products" in different categories The authors offer a behavioral rationale for the existence of the effects of "other products'" marketing efforts and propose a taxonomy of possible intercategory relationships The discussion enables the authors to identify several promising new research directions

Buyers make purchase decisions in a dynamic market environment, which affords them choices from enormous numbers of products and brands as well as influence from a diverse set of marketing efforts Buyers may also be affected by the context of their previous purchases, ownership, and usage Given such diversity, demand for a product depends directly and indirectly on many things, including the current or previous marketing efforts of "other products," that is, products in different but related categories The idea that demand in one product category can be affected by marketing efforts in another is not new (Erdem 1998), but the assumption that a common brand name may be needed for such transfer to occur is too limiting Categories affect one another in ways that transcend common brand interactions

Product substitutability and complementarity have long been natural ways to perceive intercategory[1] relationships [2] Products are considered complements (substitutes) if lowering (raising) the price of one product leads to an increase in sales of another (e g , Bucklin, Russell, and Srinivasan 1998, Russell and Bolton 1988, Russell and Petersen 2000) [3] Economic theory emphasizes static demand effects associated with "other products," because complements and substitutes usually are defined in terms of extant cross-elasticity measures (e g , Deaton and Muellbauer 1980) Figure 1 depicts the conventional framework

Unfortunately, this dichotomy does not fully consider the richness of plausible interproduct effects on buyers and their market behaviors For example, consider the devices used for personal communication landline telephones, wireless telephones, and pagers Are these products complements to or substitutes for one another? How can the interproduct relationship between wireless telephones and personal data assistants (PDAs, which are taking on wireless communication functions) be characterized? These products and the dynamic interrelationships between them do not seem to fit neatly into the conventional complement/substitute framework A new product introduction is often construed as offering yet another alternative that buyers can choose rather than an alternative that can change the very nature of a market structure (e g , as Enterprise has done in

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[1] In this article, we use the term "intercategory" interchangeably with the term "interproduct" As the title of our article suggests, we are concerned with the cases in which decisions in one product category affect buyer and seller decisions in another We also would treat successive technology generations (e g , 8-bit, 16-bit, 32-bit microcomputer CPUs) or the subdivisions of a coherent broader product category (e g , portable computers desktop computers, notebook computers, handheld computers) as separate categories for discussion purposes Product category boundaries can be vague (Viswanathan and Childers 1999), but because we concentrate on the relationships between categories rather than their composition, such ambiguity is acceptable

[2] For example, the literature addresses product substitution through research on new product success or failure (e g , Cooper 2001) and technological obsolescence (e g , Christensen 1997, Utterback 1994) Product complementarity is addressed through research on product bundles (e g , Eppen, Hanson, and Martin 1991, Gaeth et al 1991, Guiltinan 1987, Yadav 1994) Our interest is in transcending these static concepts

[3] For the sake of clarity, throughout this article, we discuss intercategory effects in terms of just two alternatives We recognize that in many markets there are more than two products that interact (e g , a large-screen monitor, color printer, modem, hard drive, CD-ROM, speakers, and memory all interact in the PC market) Such cases need not require a separate discussion because the alternatives can be considered in pairwise fashion Research is needed to understand more complex cases in which contingencies and interactions among categories are present (e g , slower technological development of one system component may handicap others, modems capable of faster data transmission speeds than the input–output devices they connect to or the lines over which they transmit may limit the speed of the chain)

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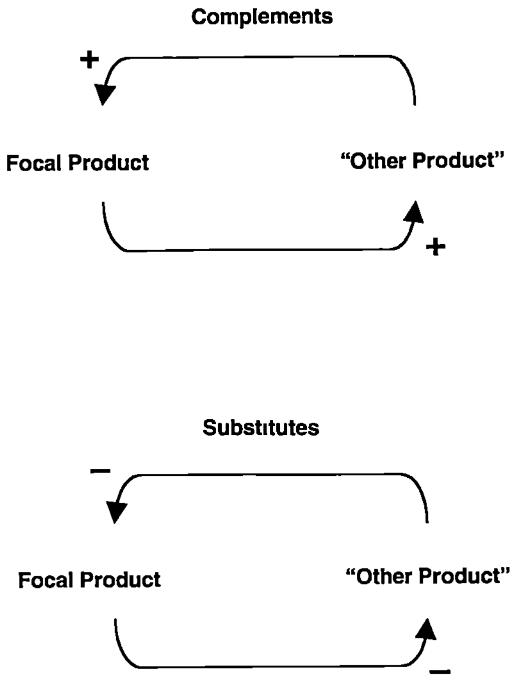
FIGURE 1
Conventional Framework of Product Complements and Substitutes



the rental car market). The introduction of a complement may increase sales of a target product or make it more suitable for more applications than it was previously (e.g., longer-life batteries improved the range of applications for laptop computers). The availability of more (differentiated) alternatives can increase the possibility of buyers finding new uses for existing products (e.g., efforts to improve bottled waters have led to new categories of water) or finding added value in complements that already exist. Recognition of a new complementary entry (e.g., microwave ovens) may alert perceptive marketers of complements to new sales possibilities (e.g., microwave popcorn, addition of a popcorn function button), because a product may be able to provide greater convenience without significant downside (e.g., taste, cost). In addition, a new product introduction can potentially change a market structure by creating new benefits or costs or by extending the range of existing benefits (e.g., Japan's entry in the U.S. automobile market had a significant effect on expectations of quality and reliability, the availability of antilock brakes and air-bag options most likely affected the importance of safety in consumers' car-buying decisions).

The recognition of product complements and substitutes may, in turn, lead to the recognition of features of one product that can usefully be applied to improve another product (e.g., capabilities previously associated with televisions, such as an "instant-on" push button, might improve personal computers [PCs], MacMillan and McGrath 1997). For example, Kim and Mauborgne (1999) suggest that market-driving new businesses succeed because they incorporate strengths and reduce or eliminate the weaknesses of competing alternatives. For example, they consider personal-finance alternatives that were available before the introduction of Quicken (i.e., accounting software and pencil and paper). Kim and Mauborgne argue that Quicken is successful because it is able to combine the low price and ease-of-use of a pencil with the speed and accuracy of traditional personal-finance software. Knowledge of existing complementary relationships is also essential for the identification of desirable product systems (e.g., wireless telephones with calendars and games may be sensible, whereas wireless telephones with camera capabilities may prove less so, even though both are technologically feasible). The incorporation of existing complements can even legitimize a new product combination because at least one market segment already purchases both separate products.

Despite the pervasiveness of intercategory relationships in the marketplace, most research that addresses competitive effects does not explicitly consider the effects of "other products." Such an omission may limit an understanding of why market structure is the way it is and may create inaccuracies in managers' abilities to predict outcomes of their marketing actions. Thus, a major purpose of this article is to sensitize researchers and managers to the relevance of "other products." As managers find uses for multicategory sales and marketing data, market research firms will be more willing to collect and disseminate them. As occurs with products in general, the ready availability of such data will likely stimulate managers and researchers to find more uses for them (much as has occurred with scanner data). We expect that more attention will be paid to hypothesizing and measuring multicategory effects.

There have already been calls for greater realism in the research of market behaviors. For example, in introducing their research into customer dynamics, Heath and colleagues (2000, p. 291) note the following: "[T]he corpus of decision theory remains focused on single decisions.... This limits our understanding of decision-making.... If we are to understand how earlier choices and ownership influence subsequent choices where competitors attack and defend turf through changes in product, price, and promotion, we will have to expand theories to recognize the many forces at work in complex settings." Day and Nedungadi (1994) strongly question the widespread managerial practice of simplifying market realities. We echo such concerns by noting, for example, that the bulk of market structure analysis (MSA) research has focused only on single-category competition. Greater understanding of the connectedness among products on the part of managers and researchers should help in the design of better strategies and tactics and in the prediction of their market outcomes. We believe this understanding will serve to

- Identify categories and brands that are the key competitor and complementor influences in the market structure (e.g., Brandenburger and Nalebuff 1996),
- Identify who relevant potential customers are and why (e.g they may already be buying in related categories, Day Shocker, and Srivastava 1979),

- Determine the attractiveness of potential opportunities (e g , Lehmann and Winer 2000), and
- Develop appropriate competitive strategies for realizing opportunities (e g , Porter 1980)

A major reason for the current inattention to "other products" may be a lack of a framework that helps researches think about these effects and gives them a terminology with which to discuss them Thus, another purpose of this article is to augment the traditional complement/substitute framework by proposing a broader taxonomy that incorporates several important static and dynamic intercategory relationships Our discussion adds to the marketing literature on competitive dynamics that arise from the interaction of buyer and seller perspectives (e g , Dickson 1992, Ratneshwar et al 1999, Rosa et al 1999) and, more important, enables us to suggest some promising new research questions

A Basis for Intercategory Effects[4]

Product Categorization

Before we discuss the rationale for intercategory effects, we consider product categorization and its role in individual-level decision making The psychology and consumer behavior literature has examined cognitive representations of categories and their ensuing information-processing implications (e g , Alba and Hutchinson 1987, Barsalou 1991, Murphy and Medin 1985, Rosch 1978, Smith and Medin 1981, Viswanathan and Childers 1999) However, only limited work has addressed key issues of why categories form and how they evolve (e g , Bettman and Sujan 1987, Rosa et al 1999) or how to define and distinguish them (e g , Do different generations of a high-technology product belong to the same or different categories? Ratneshwar and Shocker 1991)

Both buyers and sellers believe it is useful to categorize products For buyers, categorization simplifies information processing and decision making, and it facilitates interpersonal communication Categories provide a context in which similarities and differences among brands can be highlighted A category name can efficiently communicate much meaning People are also sensitive to the correlational structure of their environments and, in the interest of cognitive economy, may categorize products (at least temporarily) on the basis of factors such as physical resemblance, perceived similarity of producers, or fit with available category labels (Day, Shocker, and Srivastava 1979) From a seller's perspective, categorization speeds up individual buyer learning about new products and facilitates diffusion and promotion through word of mouth among potential buyers Categorization also enables easy communication between producers and distributors (e g , through stockkeeping units and billing information) Thus, product category formation and evolution is the consequence of purposeful behaviors on the part of both buyers and sellers Rosa and colleagues (1999) present empirical evidence that product markets are socially constructed and evolve from interactions between buyers and sellers Product markets may not always be coincident with a single product category, that buyers and sellers each need to make sense of the other's behaviors also accounts for the fuzziness of some category boundaries and their seemingly ad hoc nature (e g , Day, Shocker, and Srivastava 1979, Viswanathan and Childers 1999) [5]

Strong arguments can also be made for a constructive, flexible, and goal-driven view of product categorization First, there is considerable evidence that buyer motives and goals are important in determining buyers' mental representations of products, that is, which alternatives they attend to and which aspects they consider more important (e g , Barsalou 1985, Loken and Ward 1990, Ratneshwar, Pechmann, and Shocker 1996, Ratneshwar and Shocker 1991) Second, category representations may be flexible because they can be contingent on goals that are salient in any given usage situation or context (e g , Bagozzi and Dholakia 1999, Barsalou 1991, Ratneshwar and Shocker 1991) For example, Ratneshwar and Shocker (1991) find that category typicality judgments people made in the context of specific product-usage situations (e g , snacks that people might eat while drinking a beer at a Friday evening party) were significantly different from judgments they made in response to simpler category cues (i e , snack foods) Apparently, the contextual information framed buyers' perceptions by focusing their attention selectively on situation-relevant aspects of products (i e , whether a snack is salty, crisp, divisible, and convenient to eat at a party)

In mature product markets, many different products that serve the same general need can coexist (e g , both subcompacts and pickup trucks provide personal transportation) A key reason for the proliferation of categories is that producers face technological barriers to serving multiple, specific buyer goals optimally (e g , it is difficult to provide both fuel efficiency and roominess in personal transportation) Across buyers or households, there also may be heterogeneity in preferences in terms of the importance they attach to different goals or desired benefits (e g , fuel efficiency versus roominess) Given both technological constraints and buyer heterogeneity, producers create, label, and position different products to serve disparate buyer goals optimally (Ratneshwar, Pechmann, and Shocker 1996) In such cases, buyers are likely to perceive that products in the same category deliver only on certain goals and that options in different categories have negatively correlated attributes

Intercategory Effects

Russell and colleagues (1999) identify three ways that choices across different product categories can be linked (1) cross-category consideration, (2) cross-category learning, and (3) product bundling In cross-category consideration, several product categories (and possibly many options or brands in each category) are effective substitutes (Srivastava, Alpert, and Shocker 1984). Roberts and Lattin (1991), Shocker and colleagues (1991), and Graonic (1995), among others, provide empirical evidence for the existence of multicategory choice sets.

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[4] This section borrows extensively from Russell and colleagues (1999)

[5] Important questions that cannot be answered here are, What exactly is a product category? How are they created (by buyers, sellers, or others)? and How do they evolve? We assume that categories exist, that they have a hierarchical structure (in which superordinate and subordinate categories complement a main category), and that new generations may also be new categories when they are sufficiently differentiated However, the arbitrariness of category definition should not detract from the points we make herein

An intercategory effect can also be activated by the context of previous choices. Such cross-category context or learning effects are present when choice in one category is influenced by the prior possession of, experience with, or use of products in other categories. A buyer who is satisfied with a certain brand (e.g., Maytag) or technology (e.g., digital) in one category (e.g., washing machines, pagers) may be more likely to purchase from another category in which the same brands or technologies appear (e.g., dishwashers, wireless telephones; Erdem 1998; Kim, Chang, and Shocker 2000).

In product bundling, items from multiple categories jointly contribute to fulfill buyers' wants, which leads to buyers selecting several different products (usually on the same or proximate shopping occasions). Most complementary products used together fit into this classification even though they are not always purchased together (e.g., hot dogs and buns, computers and software). Sellers often assemble bundles that consumers can accept or reject (e.g., a package of standard equipment for a new car). In some cases, distributors or consumers assemble the package (e.g., a stereo "system" that comprises complementary components from competing firms, such as a Sony receiver with Yamaha speakers, even though each brand offers both components). It is less recognized that consumers often examine products category by category and create their own (personalized) bundles (e.g., an assortment of liqueurs to serve to guests after dinner, a grocery shopping basket; Farquhar and Rao 1976; McAlister 1979; Russell and Kamakura 1997). Bundles are items that buyers might purchase together, because the items meet a buyer's goal (e.g., convenience) by being available from the same store or supplier. However, a retailer may serve other buyer goals by, for example, prepackaging products to be sold as gifts (saving time) or by assembling different category components (ensuring compatibility and connectivity).

In all three ways, the buyer's purposes or goals are central. Purpose (which is sometimes implicit in a usage or purchase situation) provides coherence for the multicategory decision by helping define the benefits that the buyer wants (Bagozzi and Dholakia 1999; Yang, Allenby, and Fennell 2002). The definition of relevant benefits is often tantamount to the definition of the products that buyers will consider. It is possible that product categories have hierarchical relationships because the purposes that influence their construction are also hierarchical (Ratneshwar, Mick, and Huffman 2000). Products are able to serve multiple purposes because they provide "affordances," which, according to Ratneshwar and colleagues (1999, p. 194), are "the potential benefits and disadvantages of a product ... in relation to a particular person" that can be actualized on different occasions. Thus, consideration of product complementarity or substitutability without controlling for the effects of purpose creates ambiguity.

Ratneshwar and colleagues (1999) provide evidence in support of three factors that affect product and service decision making. In addition to purpose, they recognize that the awareness and availability of products and services matter to the decision maker for at least three reasons. First, constraints on the number of available alternatives (e.g., a restaurant with a limited selection of entrees) may force consumers to consider and choose across multiple categories (Johnson 1989). Second, the visual configuration of choice alternatives may juxtapose multiple competing categories and thus prompt cross-category consideration (e.g., restaurant menu, retail store display, mail-order catalog, Web site). Third, access to certain complements already used may enable a buyer to use a core product in particular ways (e.g., a PDA with an add-on that enables it to function as a wireless telephone and offers synergy that may afford it some advantages over more specialized products). The buyer's own preferences (conditioned by past experience and knowledge) are also important. In addition, the context of "other products" and buyer preferences may play a role in defining relevant product substitutes. Thus, the "three P's," or person, products, and purpose, are useful factors for examining why multicategory decisions occur and for predicting their possible outcomes.

We began this section by noting that categorization is an important function of people's decision making. Buyers' and sellers' product categorization is based on commonly understood sets of related products that facilitate communication. Although buyers create categories to simplify decision making, their choice processes often span multiple product boundaries (Ratneshwar, Pechmann, and Shocker 1996; Viswanathan and Childers 1999). A key reason for this is that buyer purposes or goals are situation specific, whereas at least in the short run, categories remain reasonably stable (Srivastava, Leone, and Shocker 1981). Buyers need not respect single category labels if alternatives in a particular category are not adequate to satisfy their purposes or if products in different categories are adequate (Shocker et al. 1991). Sellers have similar freedom, and by offering new product alternatives, they can sometimes even change category meanings (e.g., the phrase "taking an aspirin" became inadequate as a description of all painkillers when acetaminophen, ibuprofen, naproxen, and others entered the market).

What Are the Plausible Effects of "Other Products"?

In this section, we provide an extended view of intercategory relationships, a view that moves beyond the conventional framework of complementarity and substitutability to consider the richness of plausible effects more fully. Our taxonomy of intercategory relationships in Figure 2 includes both static and dynamic cases. Static relationships are stable and tend to persist largely unchanged for a long time. They are sustainable at an individual level because the categories continue to fulfill similar buyer requirements (stable purposes). Static relationships may offer similar performance/price ratios (Kim, Chang, and Shocker 2000), and they may include products that can be simultaneous complements and substitutes, for example, a hamburger and a diet soft drink are normally complements, but because consumption of the low-calorie diet soft drink may enable buyers to rationalize consumption of the high-calorie hamburger, the products also have a substitute relationship Because some purposes arise relatively frequently and others arise only occasionally, static buyer behavior may reflect the different learned responses or environmental circumstances that influence buyer behaviors

In dynamic relationships, the products and/or their relationships are in transition over time, and the products ultimately may not coexist Dynamic relationships may reflect (1) product order of entry (i e , a category that already exists and serves as a context for decision making and affects factors such as product appreciation and access to distribution channels), (2) transitions between substitutes and complements in which complement bundles become substitutes for the original unbundled products (e g , a clock radio can substitute for a dedicated clock and dedicated radio), or products that were originally designed as imperfect substitutes come to coexist as complements (e g , pagers and wireless telephones, e-mail and voice-mail), (3) transitions within complements in which originally nonessential complements become more essential, and (4) transitions within substitutes in which either the new or the existing product eventually dominates

FIGURE 2
An Extended View of Intercategory Relationships

A. Static

Level of Purpose	Substitutes	Complements
Specific	1 Substitutes-in-use	3 Complements-in-use
Nonspecific	2 Occasional substitutes	4 Occasional complements

B. Dynamic

Order of Entry	Substitutes	Complements
Newer affects existing	1 Product displacement	3 Enhancing complement
Existing affects newer	2 Product perseverance	4 Augmenting complement

C. Dynamics Between Substitutes and Complements

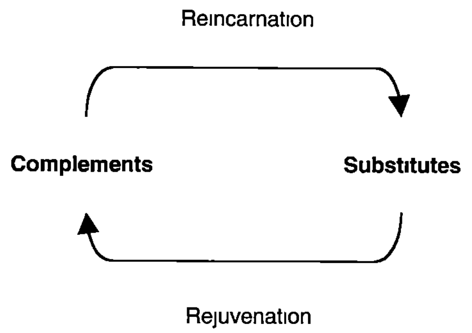

Figure 2 is framed in terms of possibilities that operate at the individual-buyer level (i e , what an informed buyer who is knowledgeable about the relevant categories might comprehend) Because relationships can change with time as categories are modified and because buyers are heterogeneous in terms of their awareness, knowledge, and purposes, aggregate market relationships may not always indicate the individual-level effects that underlie them (i e , aggregate intercategory relationships may merely represent an averaging of the heterogeneous relationships at the individual level)

Static Intercategory Relationships Across Buyers

Substitutes-in-use In the case of substitutes-in-use, multiple product categories compete because they are able to serve a similar defining purpose and thus may have similar potential customers (e g , Srivastava, Alpert, and Shocker 1984, Srivastava, Leone, and Shocker 1981, see Figure 1) In this case, all competing products deliver requisite benefits, even though each may deliver against others as well Because of trade-offs, one product often does not dominate the other (e g , digital videodiscs and videotapes offer trade-offs in picture quality and cost that have enabled them to coexist, however, as cost differences narrow, the coexistence may change) Sometimes a price or distribution channel precludes the categories from competing more directly (e g , national and private label brands), thus, the categories' substitutability becomes evident only when the more expensive brand is on sale or when they have similar distribution (Blattberg and Wisniewski 1989) The relationship is often asymmetrical in magnitude, for example, a national brand may serve a broader set of purposes than a private label product (particularly in the case of conspicuous consumption), and thus the latter may not substitute effectively even when it is on sale General purpose products (e g , laundry detergents) can be substitutes for more specialized or niche products to a meaningful degree (e g , other cleaning products), but the converse may not hold

Preferences among substitutes-in-use can largely be a matter of buyer taste rather than performance quality alone However, these products still negatively influence one another's sales A desire for variety or redundancy may sometimes motivate the purchase of substitutes, thereby creating a form of complementarity Stair-climbers, stationary bicycles, rowing machines, and treadmills all offer an aerobic workout and thus may be considered substitutes, even though some are more suitable for certain buyer segments (e g , recumbent bicycles may put less strain on the back than conventional stationary bicycles, Graonic 1995) Substitutes-in-use need not physically resemble one another, but they can do so if form is essential to function Services can substitute for products (e g , leasing rather than owning a car or computer, software-based services that perform the same functions as hardware) What is important is that it is primarily the "person" in the three P's framework that determines the extent of substitutability

Occasional substitutes Occasional substitutes satisfy a higher-order, more generic purpose Purpose is hierarchical, there may be general or superordinate purposes and more specific subordinate purposes The more general the purpose, the greater is the number of products that provide a degree of competition (e g , several products all serve the general purpose of providing "pleasure," but a buyer will only purchase one of them because of budget constraints, Lehmann and Winer 2000) Because of this generality of purpose, the specific alternatives and their actual substitutability may be highly idiosyncratic because a person's preferences play an important role

Even at the same level of specificity, categorization of certain new products may be amenable to cues An overriding purpose might be suggested by the context of "other products" or the physical form that they assume For example, granola bars might originally have been credible as candies, cookies, health foods, or a separate snack category, but a section of the supermarket in which they are shelved can suggest a preferred positioning Store traffic and image can be built by promoting certain brands and categories (Chintagunta 2002) Because inherent ambiguity remains, the focal product may retain some substitutability with products in each of its plausible categories (e g , granola bars can be substituted for cookies) The packaging of products in containers associated with another category can strengthen (or weaken) associations with the product's category or with another category's major benefits (e g , gel toothpaste packaged in containers associated with mouthwash may strengthen its breath-freshening associations)

Complements-in-use Complements-in-use enhance the growth prospects of one another, and their coexistence is affected by user purpose (see Figure 1) For example, PCs and application software have exhibited a positive, reinforcing influence on each other for more than 20 years (e g , Gates 1998) In many cases, complements-in-use are products that essentially have limited value without the other (e g , hardware and software, television sets and programming) In other situations, such complementary products can be used independently, but they usually are not because a superior result can be achieved jointly Recognizing these intercategory relationships, firms have often followed a pure or mixed product-bundling strategy (e g , Eppen, Hanson, and Martin 1991, Guiltinan 1987) For example, airlines and travel-related Web sites offer mixed bundles that include air travel, lodging, and rental cars, some physicians require that their patients undergo various multicategory diagnostic procedures (pure bundling) with their physical exam

Occasional complements Occasional complements offer another array of possibilities For example, products that are intended to be used together exert design influences on each other (e g , the size of a briefcase or the trunk of a car should reflect the size and nature of the "other products" they are intended to contain) Prominent features of one product may be used to describe similar features in another These effects can be unrelated to price Products that are commonly sold in the same stores or displayed near one another may exert weak effects on one another's sales A buyer's observation of one product may influence impulse buying of another as a result of a kind of "reminder" promotional effect A brand name that has strong associations in one product category (e g , Johnson's Baby Shampoo) may transfer the associations to others (e g , bandages, talcum powder) that may be weak complements (Loken and John 1993, Russell and Petersen 2000) As part of their rationale, cobranding or branded ingredient strategies have such cross-category associations (Park, Jun, and Shocker 1996)

Dynamic Intercategory Relationships Across Time

Product displacement Product displacement is a substitute relationship in which "new and improved" categories come to dominate older ones and eventually make them obsolete It is notable that an older product can contribute to its own demise by sensitizing customers to its deficiencies, which then speeds the adoption of a new product that promises relief When retailers recognize product superiority for their customers, a newer product may use the same channels of distribution as the older product (e g , compact discs [CDs] are sold in many of the same outlets that formerly sold cassettes and records) Sellers can force or speed displacement by phasing out and ceasing to supply the older product when both appeal to similar customer bases (e g , Apple removed floppy disk drives from its new PC models in favor of CD or digital videodisc drives) Successive product generations often fit this case (e g , among PC peripherals, 3 5 inch disk drives originally displaced 5 25 inch drives because the newer disks were more durable and smaller and offered greater data capacity at little or no extra cost)

Sometimes the displacing product creates a new category instead of serving as a subcategory of the displaced product (e g , cars replaced buggies as basic transportation, calculators replaced slide rules) Presumably, the greater the differences between the new product and the previous category (e g , physical appearance, technological platform, manufacturer), the greater is the likelihood that previous category labels no longer suffice It is also possible that when the first mover appears, initial attempts at categorizing the innovation evoke existing categories (e g , horseless carriage), but as more competitors enter with similar products, a new category name is created (e g , car) The speed and magnitude of displacement should depend on whether the benefits and costs (i e , the value proposition) of the newer product dominate the older product Writeable CD-ROMs, superdrives, zip drives, and portable hard drives are categories that now compete to replace many applications that the floppy disk previously handled Displacement seems inevitable whenever a newer product offers higher (equal) levels of all core benefits that are provided by the older product but at little or no added cost (i e , a higher performance/price ratio) When products are displaced, they may be scrapped or diverted to less prominent uses or less sophisticated users When this happens, new purposes sometimes become relevant (e g , calculators are used for more applications than slide rules ever were)

Displacement is an outcome of competitive rivalry, as are coexistence (implied by substitutes-in-use) and produc perseverance What makes these cases dynamic is the method and time frame in which competition occurs The phrase "predator–prey" characterizes a class of such dynamics (Moore 1993) Targeting similar customer needs, a new product (the predator) that is usually equipped with a higher level of technology than existing products enters the market and encroaches on the incumbent products' (the prey) market potential (e g , Berryman 1992, Moore 1993) Facing new threats, the incumbent firms either disappear or react by enhancing their competitiveness These firms' efforts can take the form of product or process improvements, lowered prices, or product repositioning For example, plastic containers have largely displaced fiber cans for motor oil because of their ability to be opened without a tool and their integration of a pouring spout Clear plastic has largely displaced glass bottles because of its lighter weight, squeezeability, and greater resistance to breakage at only slightly higher cost However, in the case of all-plastic containers (the predator) threatening paper cartons (the prey) for refrigerated juices and milk, manufacturers of paper containers were able to fight back by adding plastic coating and pouring spouts with screw-on caps to improve the containers' functionality, thereby leading to coexistence

Product perseverance Product perseverance is a substitution type wherein a newer category fails to displace the older one Although many factors have been offered to explain new product failure (including the possibility of inadequate marketing), failure to meet customer needs adequately is a frequently cited reason A manager may misjudge whether the benefits of the new product exceed the old or fail to understand the full range of added costs that the new product's purchase or use necessitates For example, in the PC industry, the first handheld PDAs did not fare well against incumbent products (e g , laptops, paper-based organizers) even though a later variant (the Palm Pilot) has been quite successful A new product that has poor underlying technology can impede the success of later products based on the same technology (e g , Microsoft's Bill Gates stated that the Apple Newton fiasco hindered development of the handheld PDA product category, Bayus, Jain, and Rao 1997) Buyers may be sensitized to the aspects of the product (e g , handwriting recognition) that were troublesome in failed versions, which creates a ready market for a credible improvement In addition, a brand may be unable to reintroduce an improved version of a failed product (e g , Apple eventually cut its Newton division because management believed the company was not strong enough to resurrect the brand) despite subsequent evidence of turnaround in the category

Analogous to the predator–prey relationship is one that we term "prey–predator" (Moore 1993) A prey–predator multicategory relationship is characterized as a kind of competitive role reversal The new product enters the market because it senses opportunity in the limitations of existing products, but by exposing the limitations, it awakens the existing product, which then becomes the victor An example is DuPont's Corfam (see Hounshell and Smith 1988) After years of development and heavy research and development expenditures, in 1964 Corfam was heralded as the technological product substitute for leather Targeting the high-end shoe market, Corfam had proved itself in tests to be equal or even superior to fine leather because it was unaffected by moisture, weighed one-third less than leather, kept its luster, and did not need to be broken in Although DuPont initially faced retailer and consumer resistance to Corfam shoes, the critical factors that spelled Corfam's death were the entry of European fashion shoes made of many different styles of leather and the leather industry's promotion of glovelike leathers, which Corfam could not duplicate Thus, Corfam was relegated to competing with cheaper vinyl shoes Although Corfam was superior to vinyl, DuPont could not earn a profit because of Corfam's high manufacturing costs

Enhancing complements Enhancing complements occur when a newer product enhances the sales of an existing one by improving its functionality (e g , increased availability, easier to use) In general, enhancing complements lead to higher benefit levels for the existing product with which they are used rather than introduce new benefits (Kim and Mauborgne 1999) Well-publicized uses for the newer product increase the likelihood that many buyers will insist on such higher benefit levels in existing and future products In this case, the newer product positively influences sales of the existing and more basic product Enhancement also occurs as a result of training or learning Owning a bicycle may create a feeling of freedom that will subsequently be enhanced by automobile purchases later in a person's life In such relationships, the interfaces between product components can be especially important, and sales of the enhanced products are furthered by a common standard to ensure compatibility and interchangeability (Shapiro and Varian 1999) Sometimes the interface itself becomes another product that is needed to make a product system function better (e g , modems enable communication between the Internet and PCs, a car kit enables a portable CD player to play through the existing car radio)

Augmenting complements Augmenting complements add new benefits that were not formerly present in an existing product (e g , combining a radio with a clock allowed for an alarm of varying sound and enabled a buyer to program the radio) Augmenting complements often are synergistic and usually are cases in which an existing product has a major sales effect on its newer complement, because its limitations either have created reasons for a complement to exist or have legitimized its existence For example, e-mail capability (existing product) positively affects a buyer's ownership of a digital camera (newer product) because it enables photographs to be sent with text as well There may also be priority patterns that determine the order in which related products are purchased, that is, more basic purposes may be satisfied before less basic purposes (e g , a washing machine before a dryer, a savings account before a mutual fund investment) Again, common purpose may influence people's purchase sequence (Harlam and Lodish 1995) Marketers can influence sales of augmenting complements by means of the ties with older products they emphasize in rationalizing or positioning the newer product This can help buyers better understand the fuller range of product benefits, that is, the combined benefits of both products (Eppen, Hanson, and Martin 1991)

Sometimes the relationship between products can be both substitute and complement, that is, two products may be complements for one purpose but substitutes for another These individual-level effects may cancel one another out so that an aggregate intercategory relationship distorts individual-level realities Different users may purchase products for different reasons or the same users may use products differently at different times or in different contexts The multiple uses that such products serve may be their major (possibly unrecognized) competitive advantage For example, a VCR is a complement to a television when it provides an additional tuner to enable picture-in-picture capabilities or the recording of one television show while watching another, but the VCR also is a substitute input to an antenna, cable, or a satellite dish As another example, television news, news radio, news magazines, the daily newspaper, and the Internet are complements because they are differentiated by timeliness and depth of reporting (e g , some are immediate and others are delayed, some offer analysis in addition to headlines) However, these products can also be part of a substitute portfolio of products purchased by someone who desires limited detail (McAlister 1979) Product bundling or other product complexity sometimes enables the resulting product to play multiple roles in terms of its relationships with other products

Dynamics Between Complements and Substitutes

There are dynamics not only within substitute categories or complements but also between the two Changes in buyer demands may result in a gradual shift from noncompetitive intercategory modes (i e , complements) to competitive ones (i e , substitutes), and vice versa We term these modes *reincarnation* and *rejuvenation*, respectively As an example of reincarnation, consider the relationship between Microsoft's Windows operating system and Netscape's Navigator Web browser, which was initially an augmenting complement An awakened Windows became the predator after it incorporated its own Web-browsing capability (Gates 1998) Another example is the relationship between wired and wireless telecommunications technologies Initially, the wireless telephone was an enhancing complement to regular wired telephones (i e , used for different purposes) Recently, because of "free" long distance and other pricing practices, consistent quality improvements, and the long delays required to obtain wired telephone installation, in many Asian countries and increasingly in the United States it is common for wireless telephones to displace wired telephones for regular use at home

As an example of rejuvenation, consider film entertainment in the 1950s When television was first introduced, it was presumed to represent a major threat to motion pictures because a person could watch movies at home instead of traveling to the theater Both were forms of entertainment, but they had different uses, users, and occasions for use Television's small screen, inconsistent reception quality, and the initial absence of color were major hurdles However, because of the perceived threat, movie studios refused to allow their facilities to be used to produce television shows and ran large-scale promotional campaigns that urged consumers not to purchase television sets (Boddy 1990) Television persisted, though, and the two entertainment modes coexist today Eventually, movie studios became producers of television shows, which became an even bigger business for them than movie production They belatedly realized that so long as first-run movies were not aired contemporaneously with their showing in theaters, television could serve as a complementary entertainment medium

In some industries, technological progress and market restructuring occur so quickly that intercategory relationships oscillate in a relatively short period An example of this is the wireless telecommunications market in Hong Kong (Kim, Chang, and Shocker 2000) and elsewhere When analog-type wireless telephones were first introduced to Hong Kong in 1986, most users came from the existing pager user group At that time, people usually owned both a pager and a wireless telephone because of the unstable communication quality of the analog telephone (the products were enhancing complements) Because of continuous technological improvements to the wireless telephone, it began to substitute for the pager From the late 1990s onward, the relationship has been evolving back to a complementary one in which many wireless telephone users also own pagers to check incoming calls while they have their wireless telephones turned off In addition, by adding some augmenting complementary accessory functions (e g , games, calendar, travel information), the pager has developed its own market niche

Future Research Directions

In Which Circumstances Are Intercategory Effects Most (Least) Likely to Occur?

Intercategory effects may be a consequence of differences in buyers' and sellers' category definition If buyers consider benefits and costs and sellers consider product features and prices, such differences can arise Research is needed both to better understand the nature and level of categorization that different decision makers use and to identify the circumstances in which cross-category consideration and choice are most (least) likely to occur Whether the stage of product life cycle, individual differences (e g , experts versus novices, different personality types), purpose, or other factors matter more has not been investigated Although Ratneshwar, Pechmann, and Shocker (1996) provide empirical evidence that the individual characteristics of goal ambiguity and goal conflict lead to multicategory consideration, the possibility of other explanations (e g , involving economic factors such as similar prices) needs to be clarified in further research Managers should also be interested in findings that can provide guidance as to how intercategory effects are best used to the managers' advantage However, no research has examined how easy or difficult it is to encourage normally single-category decision makers to consider other relevant alternatives

It seems that economy (i e , price), brand reputation design, and versatility are examples of product benefits tha can be readily measured across multiple categories These benefits may serve as general dimensions because they are closely related to supercordinate buyer purposes or goals (e g , buyers will only consider "other product" alternatives in acceptable price ranges or of acceptable brand names because of who they are or the purposes such products serve) Whether there are only special kinds of goals (e g , gift giving) that favor multicategory over single-category consideration also is worthy of further investigation

How Does Multicategory Decision Making Differ from Single-Category Decision Making?

Benefits and costs seem desirable for representing product alternatives in the modeling of multicategory decision making If a new product has similar purposes as others and its benefit levels are known, an informed marketing manager may be better able to predict product success or failure For example, if whitening ability, safety to clothes and environment, and economy are understood as the major benefits desired of laundry detergent, a product category that offers higher or equal levels of these benefits (assuming little additional cost) can be expected to be successful (product displacement) Similarly, a dominated new product can be perceived as having problems with product perseverance Research is needed to find the best way to identify all core benefits, because it is their totality that determines a product's market success This problem is complicated but not unsolvable when a product is not dominant (or dominated) or when different market segments emphasize different benefits and costs

An attempt to model decisions in terms of benefits and costs rather than physical characteristics raises questions of trust, credibility, and validity Benefits are inferred by buyers and suggested by sellers (with puffery) Thus, if only the benefits of an alternative are described to a buyer, the buyer must ordinarily assume that the product will deliver the benefits In addition, if a desired product is described to a seller, the seller must know how to create the bundle Product analogies may prove useful in successfully describing benefits that may otherwise be ambiguous Some benefits may be abstract (e g , as safe as flying) or involve sensory characteristics for which well-developed vocabulary does not exist (e g , tastes like Belgian chocolate, soft as a luxury hotel's plush towel) Research can usefully determine how well prominent characteristics of highly familiar products are useful analogies for accurately communicating benefit levels (and which types of analogies do it better) This is important to Internet commerce in which certain goods may not be sold successfully against bricks-and-mortar competitors unless their sensory characteristics are validly described

When do existing products provide a context that affects the evaluation of new substitutes and when will the first mover in a category be able to set its own norms? We have argued that "other products" can affect the reference points used in buyers' decision making in another product category Are there predictable circumstances when this occurs? Can experiences with "other products" or the marketing changes in those categories be more influential than same-category determinants of reference values? Carpenter and Nakamoto (1989) show that first movers can establish initial reference points or norms, but they do not establish the circumstances in which this would occur Pricing research has shown that reference points can change, it has identified a list of causes including substitute products (Kalyanaram and Winer 1995, Winer 1988), but it has not attempted either to measure when each has greater impact or to document circumstances in which experiences with substitutes may dominate experiences with the same products The addition of complements to a core product can sometimes create a new category and affect change in reference values Managers can benefit from greater understanding of the effects that their plausible actions in the same or related categories might have

Another area of research importance is what might be termed "transfer of preference" (affect), which presumably is what makes brand extension effective (Bhat and Reddy 2001, Broniarczyk and Alba 1994, Erdem 1998) The literature establishes that the attributes or characteristics of a parent brand are more likely to be transferred to its brand extension than will overall liking or preference However, the literature does not examine the possibility that modeling of buyer preference in one product category will enable such models to be used to predict choice in a substitute or related category (e g , one that has benefit and cost similarities) Such a capability would be important in predicting demand for new products (as long as the products were close substitutes) Currently, using conjoint analysis, commercial research emphasizes data for decisions in a single category It may prove possible (with appropriate scaling of weights) to preserve some information collected in a study (e g , benefit–cost trade-offs) to approximate decision making in another study in a related category Several researchers have noted that there are similarities in the importance of similar product characteristics (more likely with benefits than features) across certain categories with respect to decisions by the same person (e g , Ainslie and Rossi 1998, Andrews and Currim 2001, Russell and Kamakura 1997) Research may find that all benefits need not be identical between categories for such research to be useful Such findings might enable firms to save on future market research costs and aid a firm's managers in becoming more market oriented

Research might usefully examine the value that buyers place on the less important benefits that products afford (e g , augmenting complements) because buyers may pay a higher price to obtain them Can it be explained how ownership of a product that was purchased for one purpose or use increases the likelihood that a buyer will pursue other purposes for which the product is suitable? For example, when an "all-in-one" device is considered an alternative to dedicated printers, what value (if any) do buyers place on the extra benefits that product provides? Do product benefits that are not important at the initial purchase decision become more important later? (In a personal communication, the Nobel laureate Herbert Simon used the phrase "the importance of the artifact," which is based on the observation that ownership of a computer led users to pursue new uses for it) Will the all-in-one product be perceived as providing a higher level of an existing benefit (e g , opportunity to learn new skills, greater versatility) in its competition with items in the dedicated category? Will one component (e g , a printer) be inferred as higher quality because it was linked to a multitude of others (e g , fax, scanner)? Do buyers ignore potential benefits (Ratneshwar et al 1999) at the time of purchase and discover them only later? Research is needed to better understand what makes multicategory decision making different from single-category decision making

How Do "Other Products" Affect Product-Market Structure?

Market structures have often been determined by means of perceptual mapping, but these maps offer only a snapshot of structure at a particular moment in time "Other products" might provide key input to the modeling of dynamic changes in structure and enhancement of the prediction of change Are there predictable patterns to how intercategory relationships will evolve? Intercategory effects seem particularly important when examined as processes over time, and research can usefully examine this For example, buyer perceptions of product quality change, possibly because of changes in the environment of "other products" (e g, enhancing complements may suggest quality improvements, thus making current customers less satisfied, augmenting complements may add new criteria by which buyers can judge quality) Quality perceptions often vary with user purpose, because purpose largely affects the benefits attended to by buyers and sellers However, purpose may change as a consequence of "other product" availability (e g, components that enable portability may make different product characteristics prominent) It may be possible to generalize about the determinants of quality from "other products" (i e, substitutes, but perhaps also complements) that are used for similar purposes

We noted previously that failed or limited technology in one category may limit the competitiveness of "other products" based on the same technology (and success may expand potential) Benefit limits in one category may enhance the appeal of a related product (e g, pagers may have aided acceptance of wireless telephones) Such dynamic market structures might be used to verify that a particular historical evolution of substitutes and the existence of complements is necessary for a category to evolve similarly, such as in different countries If a firm introduces only the latest generation of a product that is successful in one country into another country, the product's rate of diffusion and eventual success may differ (e g, analog pagers and wireless telephones may have been necessary to appreciate fully the subsequent digital versions)

Dynamics of change lead to migration between the intercategory relationships shown in Figure 2 There may be discernable patterns in such migration that historical research methods can reveal (Golder 2000) For example, in developing product strategies, there is often a strong incentive for an existing product to incorporate features that previously were complements (e g, Microsoft Windows' additions of features such as hard drive management, zip file capability, virus protection, a media player, and Web browsing) As the product evolves, the category itself may be redefined as the new one becomes a substitute for its former complement Augmenting complements may evolve into a competitive mode as a newer product encroaches upon the existing one (e g, self-service gas stations have largely made full-service gas stations minor market players, automatic teller machines have replaced bank tellers) Practically every major university is considering the role of multimedia technologies and Internet applications in higher education and distance learning (Matthews 1999) The issue debated by university administrators is less whether the technologies are complements and more whether the technologies offer viable substitutes for face-to-face education in the future

The intercategory dynamics may lead to either coexistence of related products or survival of some selected products Bayus, Kim, and Shocker (2000) provide a review of the conditions that eventually lead to a single survivor or coexistence of related products Empirical studies based on historical methods will increase the understanding of the characteristics of market and technological environments that affect the equilibrium conditions Further research efforts should usefully examine the role that "other products" play in determining equilibrium from multicategory competition (e g, dominance of the new entrant, speed of entry of facilitating complements) If it is discovered that substitutes-in-use deliver somewhat different benefit levels or benefit combinations, insights into the future evolution of the category might be obtained

In dealing with multicategory effects, new methodologies for implementing even static MSA may be needed (for a discussion of challenges and research suggestions, see Elrod et al 2002) Incorporation of complements, composite products (e g, clock radios, all-in-one machines), and "other product" substitutes-in-use in the same study may require new modes of representation or different analytic interpretive skills There will likely be greater problems of aggregation than exist presently because of factors such as heterogeneity in perceptions, multiple purposes or contexts in which different products compete (and the relative incidence of such purpose-defined submarkets, Bucklin and Srinivasan 1991, Yang, Allenby, and Fennel 2002), and different selections of substitutes and complements in each submarket. Different brands in a category may be significant competitors for some purposes (e g, gift giving) but not for others (e g, ingredients) Research might usefully examine the value of controlling for purpose (e g, creating separate MSAs for each major purpose and later finding appropriate ways to integrate them) This research could be valuable for finding out not only how different the market structures are across different purposes but also the extent to which multiple purposes account for some heterogeneity that was formerly believed to be part of a single-category MSA

What Are Additional Managerial Implications from Influences of "Other Products"?

The study of "other products" may afford insights that are not otherwise available Some buyers may be proactive, making choices from a broader set because they recognize single-category options as too limiting (e g, because of inadequate convenience, affordability, and accessibility) For example, a buyer may prefer baking a cake from scratch to buying one ready-made or baking it from a mix because he or she can individualize it If some buyers actively make choices from a broader set of category alternatives than others do, knowledge of the set can increase the likelihood of discovering important buying criteria that may not have been revealed in a single-category context Research is needed to confirm that the inclusion of relevant "other products" in a market structure helps reveal otherwise latent dimensions (decision criteria) that affect brand choice and aid in suggesting new product or repositioning opportunity

Customers purchase from different categories for reasons, which, when better understood, might provide important guidance to marketing action For example, potential customers of a given brand currently may be buying in substitute categories However, if firms recognize the category substitutability, they might target those customers In addition, there may be purposes that normally lead only to occasional substitution Research might provide insights into ways occasional substitution can be increased (e g , an exciting new product may encourage more gift giving) Different product design, changes in distribution channels or merchandising strategy, new packaging, or pricing might influence the incidence of intercategory substitution Emphasis on new product combination with complements might lead to a distinct category whose positioning can be more affected by marketing action simply because it is less familiar to potential buyers Behavioral research might usefully examine whether cueing "other products" influences which purposes are evoked

It also seems that multicategory effects influence the ultimate effectiveness of managerial decisions about mergers and acquisitions and strategic alliance formation An understanding of possible complementors will enable managers to better coordinate their marketing actions Integrated marketing communications have long recognized the value of a coordinated program for a brand's various promotional options, some of which are not entirely controllable (e g , word of mouth, press commentary) The same integrative idea might be valuable in designing a marketing strategy in the context of "other products", for example, a firm in one category may have an incentive to assist firms in another category in developing augmenting complements

A notable consequence of intercategory effects is that a given product's potential market size is not constant, it depends on what is happening with or could be made to happen to related "other products" (Bayus, Kim, and Shocker 2000, Peterson and Mahajan 1978) Kim, Chang, and Shocker (2000) offer a way to measure the magnitude of the possible positive and negative effects, but their model has been tested only with two data sets Although the results are encouraging, the benefits of incorporating interproduct effects to improve forecast accuracy must be confirmed by additional research with other multicategory market data sets

Conclusion

The idea that demand may be interconnected across product categories is a powerful one Awareness of the interconnections should sensitize academic researchers and managers to the possibilities that "other products" render intercategory effects more controllable or perhaps identify the circumstances in which the effects cannot effectively be controlled Research results that make use of multicategory data will serve to encourage their subsequent generation and additional analyses, leading to further research results We hope that this article will stimulate more research to enhance the understanding of these effects An improved understanding of the roles of "other products" holds great promise for helping managers accomplish what is already a difficult job

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Raji Srinivasan, Gary L. Lilien, & Arvind Rangaswamy

First in, First out? The Effects of Network Externalities on Pioneer Survival

Network externalities are playing an increasingly important role in the economy, and they have significant implications for firms' marketing strategies. The authors study the effects of network externalities in conjunction with other product and firm characteristics on the survival of pioneers. They apply an accelerated failure time model to data on 45 office products and consumer durables. The authors find evidence that network externalities have a negative main effect on the survival duration of pioneers. However, for more radical products and for technologically intense products, increases in network externalities are associated with increased survival duration. The larger the pioneer, the more network externalities increase its survival duration, whereas incumbent pioneers experience a decrease in survival duration compared with nonincumbents. The findings of this article contribute to theory in marketing strategy and have important implications for firms that are developing market entry strategies for products with network externalities.

As the economy becomes more interconnected, more products in computing, consumer electronics, and telecommunications industries exhibit network externalities (Yoffie 1997).[1] Positive network externalities exist when a customer's utility for a product increases as the number of customers who use identical or compatible products increases. Some examples of products with network externalities include digital videodisc players, digital cameras, instant messaging systems, interactive televisions, and MP3 players. Given the increasing importance of network externalities in the economy, extensive literature in economics has examined the strategic and welfare implications of network externalities (e.g., Economides 1989; Farrell and Saloner 1986; Katz and Shapiro 1986). A consistent finding in the literature is that network externalities alter customer behavior (e.g., before adopting the product, it is rational for people to wait for others to adopt the product) and have important implications for marketing strategy.

Previous studies have explored the implications of network externalities on several aspects of marketing, including (1) customer behavior and market structure (Frels, Shervani, and Srivastava 2003; Goldenberg, Libai, and Muller 2002a; Shankar and Bayus 2003), (2) product-related decisions such as preannouncements (Nagard-Assayag and Manceau 2001), timing of product introductions (Padmanabhan, Rajiv, and Srinivasan 1997), and product differentiation (Esser and Leruth 1989), and (3) market entry (Gupta, Jain, and Sawhney 1999; Xie and Sirbu 1995). The effects of network externalities are acutely experienced in the high-technology sector, which constituted 14.7% of gross domestic output in 1999, up from 9.6 % in 1980 (U.S. Department of Commerce 2000), and has been growing four times as fast as the rest of the economy (Milken Institute 2000). Although there are valuable insights on marketing in high-technology markets (e.g., Heide and Weiss 1995; Weiss and Heide 1993), the area remains underresearched (John, Weiss, and Dutta 1999, p. 78).

There is a rich and diverse stream of research on the rewards of pioneering. Although some of the literature points to an advantage for pioneers (e.g., Carpenter and Nakamoto 1989; Kalyanaram and Urban 1992; Robinson and Fornell 1985; Urban et al. 1986), other research sug-

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[1] Early work in the area of network externalities (e.g., Coase 1960) focused on the negative externalities (e.g., pollution, congestion) between the users in a market and their effects on market failures. Thus, to avoid the negative connotation associated with "network externalities," some researchers (Liebowitz and Margolis 2001) use the term "network effects" to describe situations in which there are linkages between users in the network. We use the terms "network externalities," "network effects," and "networked markets" interchangeably.

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gests that later entrants may also enjoy advantages (e g , Bayus, Jain, and Rao 1997, Golder and Tellis 1993, Lilien and Yoon 1990, Narasimhan and Zhang 2000, Shankar, Carpenter, and Krishnamurthi 1998) Thus, the mechanisms that generate pioneering rewards appear to be complex We next summarize the specific findings in previous research that motivate our article

First, the detection of pioneering advantage depends on the performance metric used (e g , market share, profitability, survival duration) VanderWerf and Mahon's (1997) meta-analysis of 22 studies on pioneering indicates that studies that use market share are more likely to find a pioneering advantage than are studies that use other metrics Indeed, most of the previous research that has detected a pioneering advantage (e g , Kalyanaram and Urban 1992, Robinson and Fornell 1985, Urban et al 1986) has used market share as the performance metric There is now a need for studies that explore pioneering advantages in other performance metrics (Lieberman and Montgomery 1998)

Second, pioneering advantages may be specific to a product class or industry (Kerin, Varadarajan, and Peterson 1992, Szymanski, Troy, and Bharadwaj 1995, VanderWerf and Mahon 1997) In particular, network externalities, a characteristic of many high-technology products, may influence the rewards of pioneering Network externalities tend o create winner-take-all markets, in which one firm emerges as a dominant player and other firms, which someimes have superior products, are locked out (Schilling 2002) If the pioneer does not survive, its market share and profitability are moot issues Thus, survival is a primary performance metric for pioneers in networked markets

Third, previous research on the survival of pioneers provides mixed results Across 36 product categories, Golder and Tellis (1993) report a long-term survival rate of 53% for pioneers Whitten (1979) reports that pioneers in seven cigarette markets survived Several studies report no difference n survival rates between pioneers and later entrants, includng 18 markets for Iowa newspapers (Glazer 1985), 39 markets for chemical products (Lieberman 1989), and 11 markets for consumer nondurables (Sullivan 1992) In contrast, Mitchell (1991) and Christensen, Suarez, and Utterback 1998) find lower survival rates for pioneers in the medical diagnostic-imaging and rigid-disk-drive industries, respectively Kalyanaram, Robinson, and Urban (1995, pp G218–9) suggest an emerging empirical generalization "that order of market entry is not related to long-term survival ates," with the caveat that more research is needed to clarfy the issue

In this article, we address the following two questions 1) How do network externalities influence the survival uration of pioneers (main effect)? and (2) What factors moderate the effects of network externalities on the survival uration of pioneers (moderating effects)? We develop a model of pioneer survival that incorporates the main effect f network externalities, the moderating effects of two prodct characteristics (radicalness and technological intensity), nd two firm characteristics (size of the pioneering firm and s incumbency with respect to a previous product generaon) on the effects of network externalities on the survival uration of pioneers

We estimate our model by using data on 45 office and consumer durables products and an accelerated failure time (AFT) specification (Cox and Oakes 1984, Kalbfleisch and Prentice 1980) Our results indicate that (1) survival duration of pioneers decreases as the network externalities of a product increases, (2) radicalness and technological intensity of the product moderate the effect of network externalities to increase the survival duration of pioneers, and (3) firm size and the pioneer's incumbency moderate the effect of network externalities to increase and decrease, respectively, the survival duration of pioneers

In the next section, we define network externalities and present our conceptual arguments We then describe the data collection and model estimation procedures and the results of our empirical analysis We conclude by discussing the implications of our results for marketing theory and practice, summarizing the limitations of our work and identifying directions for further research

Conceptual Development

Characteristics of both the product and the pioneering firm influence the rewards of pioneering in a complex manner, which involves several possible contingencies (Kalyanaram, Robinson, and Urban 1995, Lieberman and Montgomery 1998) On the basis of previous research on organizational innovation, we consider both product and organizational factors moderators of the effect of network externalities on the duration of pioneer survival We include two product factors radicalness (Chandy and Tellis 2000) and technological intensity (Agarwal 1996) We also include two organizational factors firm size (Audretsch 1995) and incumbency (Henderson 1993, Mitchell 1991) The literature on network externalities provides conflicting indications about the main effects of network externalities and the moderating effects of product and firm characteristics on the effect of network externalities on pioneer survival Thus, we present arguments for both positive and negative effects of product and firm characteristics on pioneer survival (see P_1 and P_2, for such an approach for theory development in the presence of opposing arguments, see Armstrong, Brodie, and Parsons 2001, Bettman, Capon, and Lutz 1975)

Definitions

When the utility of a product to each user in a network depends on the number of users, the product exhibits direct network externalities (Katz and Shapiro 1986) For example, the utility of a fax machine is nil if no one else has one As the number of people (n) who own fax machines increases, the utility of the fax machine to each user increases in proportion to the number of possible two-way connections, n (n – 1) Indirect or complementary network externalities arise when there is a positive link between the utility to a customer and the number of other users of the product because of complementary products (Katz and Shapiro 1986) Increases in the number of users of the focal hardware product increases the availability of complementary products, which in turn increases the utility that customers derive from the focal product Videocassette recorders, compact disc [CD] players, MP3 players, and digital videodisc players exhibit indirect network externalities [2] To be consistent with previous research (Golder and Tellis 1993, Urban et al 1986), we define a *pioneer* as the first firm to commercialize a new product [3] We focus on the pioneer's survival in the product market it pioneered, and we measure its survival at time t on the basis of whether the pioneer still maintained a presence in the product market

Effects of Network Externalities on Survival Duration

Positive effects of network externalities Given the important role of the installed base for products with network externalities, a pioneer's product may achieve market power through positive feedback (Arthur 1989) A large installed base attracts more developers of complementary and compatible products, thereby enhancing the utility of a pioneer's product and speeding adoption (Choi 1994) Adopters invest in learning to use the product (e g , videogames, software) and/or in complementary products (e g , CD music titles for CD audio players), which results in lock-in and prevents defections to offerings of later entrants (Shapiro and Varian 1998) In addition, products with network externalities are sometimes characterized by a standard (e g , CD audio standard) The emergence of a standard reduces uncertainty about the eventual size of the network, thereby inducing earlier adoption by customers (Chakravarti and Xie 2002) and spurring the development of complementary products Thus, the pioneer may be able to set the standard and draw customers to its network, resulting in long-term survival Thus

> P_1 The greater the network externalities of a product, the longer is the survival duration of the product pioneer

Negative effects of network externalities Other aspects of network externalities suggest negative effects First, some innovations (e g , communication devices) initially diffuse slowly because of uncertainties associated with their potential utility when few adopters exist (Rogers 1995) Prospective customers may adopt a "wait-and-see" attitude, delaying adoption until uncertainties are reduced so that the market exhibits "excess inertia" (Farrell and Saloner 1986) This excess inertia also exists in products with indirect network externalities Hardware firms want complementors to offer a wide selection of software, but complementors wait until the new hardware has achieved significant market penetration before committing to the hardware platform Gupta, Jain, and Sawhney (1999) investigate this "chicken-and-egg" coordination problem between producers of hardware and software in the digital television market Goldenberg, Libai, and Muller's (2002b) study of fax machine adoption shows that network externalities slow the growth of fax machine adoption, thus revealing a "hockey-stick" pattern of slow growth over a long period followed by rapid takeoff The initial slow sales over a long period may provide a window of opportunity for later entrants

Second, because of excess inertia, the pioneer's development costs may outpace its revenue, which negatively affects its short-term performance Thus, the pioneer may curtail its early marketing investments, which hurts its long-term survival As customer expectations become more certain and complementary goods are developed, later entrants benefit from lower developmental costs as a result of vicarious learning from the pioneer

Third, when network externalities are sufficiently strong, as additional customers adopt the product, the marginal customer's utility of adoption increases The increasing utility of the product to customers enables later entrants to have a greater chance of success than the pioneer because of the larger network that exists at their later entry time Thus

> P_2 The greater the network externalities of a product, the shorter is the survival duration of the product pioneer

Moderating Effect of Radicalness of Product

We follow Chandy and Tellis (1998, 2000) in defining a radical product as one that incorporates a substantially different core technology and provides substantially higher customer benefits than do previous products in the market Furthermore, following Chandy and Tellis (2000), we treat radicalness as a continuous construct There are opposing arguments for how product radicalness can moderate the effect of network externalities on pioneer survival

Radical products (e g , instant photography, videodisc) involve new technologies that represent significant technological advances over existing technologies (Levin, Nelson, and Winter 1987) If the pioneering product with network externalities also provides demonstrably superior utility to the consumer, the product's compelling utility may overcome some of the excess inertia that the pioneering product initially faces The more radical the product, the wider is the window of opportunity, and the pioneer seeks to exploit network externalities in the absence of early competitors The pioneer can establish a large network, spur the development of complementary goods, and increase the utility of its product to customers Thus

> P_3 As radicalness of the product increases, the relationship between network externalities and pioneer surviva becomes more positive

In contrast, radical products are based on new technologies that offer a low initial performance–price ratio (Christensen 1997, Utterback 1994) Later entrants often refine th pioneer's product into a market-ready form in several iterations of product development The changing product ofte represents different technology platforms (e g , transitionin from transistor to solid-state electronics to integrated circuits in computers), thereby destroying the firm's investments in the previous technology (Rosenberg 1994) In networked markets, the pioneer is faced with a two-pronge marketing challenge that makes it more difficult to succeed managing product innovation as the product evolves into a narket-ready form and overcoming excess market inertia in leveloping the product's network Thus

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[2] Network externalities can be positive or negative (e g , congestion in telecommunications networks) and tangible or intangible (intangible externalities pertain to the equity of well-established brands whose customers perceive benefits of reduced product uncertainty and peer approval through their large customer bases) To provide focus, we consider only positive and tangible network externalities here

[3] We use the terms "pioneer," "pioneering firm," and "market pioneer" interchangeably

> P_4 As radicalness of the product increases, the relationship between network externalities and pioneer survival becomes more negative

Moderating Effect of Technological Intensity of Product

We define *technologically intensive products* as ones that have significant depth and breadth of technical and scientific knowledge embedded in their creation and functionality (Capon and Glazer 1987, John, Weiss, and Dutta 1999, Rosenberg 1976, 1994) A product's technological intensity s distinct from its radicalness For example, the microwave oven is high in radicalness but low in technological intensity it draws primarily from one technology domain radar technology), whereas the projection television is low in radicalness but high in technological intensity (it draws from multiple technology domains audio, optical, and computing echnologies) As does radicalness, technological intensity may have opposing moderating effects on the effect of network externalities on the survival of pioneers in networked markets, which we describe next

Higher levels of technological intensity imply greater omplexity in product design and commercialization (John, Weiss, and Dutta 1999) Technologically intensive products often involve interdisciplinary, diverse technologies embedded across firms, industries, and users (Iansiti and West 997) In such a situation, competitors face serious challenges to ensure that the diverse technologies work together well As a result, the pioneer may have a window of opportunity to establish an installed base before competitive entry, nabling it to secure its long-term survival (Lieberman 989) Thus

> P_5 As technological intensity of the product increases, the relationship between network externalities and pioneer survival becomes more positive

Technological intensity of products may also hurt the ioneer's survival in networked markets Technologically intense products are characterized by rapid changes in the arly stages of market development (John, Weiss, and Dutta 999, Utterback 1994) The pioneer may be forced to keep rudimentary design that is rendered obsolete by later esigns Technologically intense products are also characterized by heterogeneity in adopter cohorts as the market volves from introduction to maturity (Moore 1991, Rogers 995) To appeal to later cohorts, the pioneer must redesign s product often, perhaps relying on disruptive technologies hat can make previous investments obsolete (Christensen 997) The subsequent product designs, based on new technologies introduced by later entrants, may find rapid market cceptance, thereby reducing the chances of the pioneer's urvival Thus

> P_6 As technological intensity of the product increases, the relationship between network externalities and pioneer survival becomes more negative

Moderating Effect of Size of Pioneer

Two opposing arguments can be made for the moderating effects of firm size on the effect of network externalities on pioneer survival First, there is a strong positive relationship between size and survival of firms (Audretsch 1995) [4] The positive relationship may be enhanced in networked markets, in which a large pioneer, by virtue of its resources (e g , brand capital, financial resources), may reduce uncertainty about the size of the final network among potential customers Large firms can also access complementary assets (e g , existing networks of users, complementary products) to develop the network more efficiently than small firms can (Teece 1986) Thus, in networked markets, the large pioneer can reduce the uncertainty for potential adopters, enabling rapid buildup of its product's network and increasing its chances of long-term survival Thus

> P_7 As the size of the pioneer increases, the relationship between network externalities and pioneer survival becomes more positive

Second, a large firm has several layers of staff (Blau and Schoenherr 1971), which can delay response to new technologies and market opportunities (Kimberly 1976, Tornatzky and Fleischer 1990) In addition, the structure of large organizations can reduce incentives for individual innovators (Cohen 1995) In networked markets, such bureaucratic inertia provides an opportunity for a later entrant to establish a network and attract customers to its network Thus

> P_8 As the size of the pioneer increases, the relationship between network externalities and pioneer survival becomes more negative

Moderating Effect of Incumbency of Pioneer

Consistent with previous research (Chandy and Tellis 2000, Henderson 1993, Mitchell 1991), we define an *incumbent* as a firm that markets a product belonging to the previous product generation that satisfied the same customer need Some aspects of incumbency can aid survival, whereas others can hurt it Having marketed products from the preceding generation, incumbent firms have access to assets such as market knowledge, brand equity, and customer relationships (Thomas 1995) Incumbents are likely to have access to existing customer networks, which may ensure backward compatibility of the pioneering innovation with the product from the previous generation and reduce switching costs for potential adopters Compatibility advantages may also operate with respect to producers of suppliers' goods and complementary goods In networked markets, incumbent pioneers can leverage their existing networks and offer greater utility to customers than nonincumbent pioneers, thus securing their long-term survival Thus

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[4] Although the effects of firm characteristics may apply to all pioneers to some extent, the effects of firm size and incumbency are particularly important in products with network externalities, which are characterized by considerable uncertainty about the potential size of the network, the standard, and the availability of complementary and compatible goods

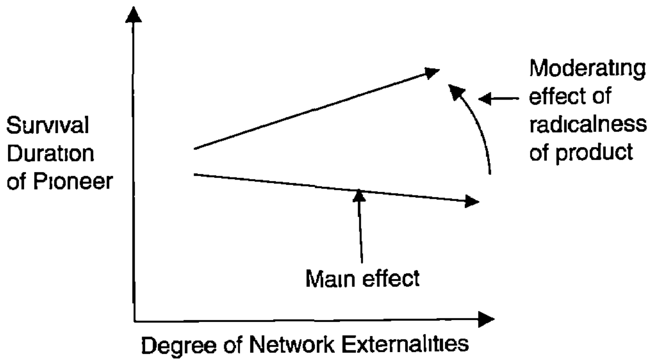
> P_9 The relationship between network externalities and pioneer survival is more positive for incumbent pioneers than for nonincumbent pioneers

In contrast, incumbents are prone to technological inertia (Foster 1986, Ghemawat 1991), and their efforts in new product marketing are often characterized by underinvestment (Henderson 1993) Thus, incumbent pioneers may be reluctant to make the large investments that are necessary to support the new technology, which may threaten the firm's existing product (Christensen 1997) Such inertia may be intensified in networked markets because of the cannibalizing potential of the new product's network Thus

> P_{10} The relationship between network externalities and pioneer survival is more negative for incumbent pioneers than for nonincumbent pioneers

In summary, our conceptual arguments suggest that network externalities and the moderating effects of product and firm characteristics exert countervailing forces on the effect of network externalities on the survival of pioneers Table 1 summarizes these arguments Figure 1 illustrates how product radicalness can have a positive moderating effect (P_3) on the relationship between network externalities and firm survival, resulting in a counterclockwise rotation of the main effect relationship We next describe the data collection procedure, the measures, and the model we estimate to investigate the effects of network externalities on pioneer survival

FIGURE 1
Moderating Effect of Product Radicalness on the Effect of Network Externalities on Pioneers' Survival Duration


Survival Duration of Pioneer
Moderating effect of radicalness of product
Main effect
Degree of Network Externalities

Method

Data

We used three criteria to collect data for this study First, to provide the necessary variance in network externalities, we identified two classes of products office products and consumer durables that exhibit various degrees of network externalities The two product classes have been studied in previous research on innovation diffusion and pioneering (Chandy and Tellis 2000, Golder and Tellis 1993, 1997, Sultan, Farley, and Lehmann 1990), which we build on in this

TABLE 1
Summary of Conceptual Arguments and Findings

Variable	Positive Effect on Survival Duration of Pioneer	Negative Effect on Survival Duration of Pioneer
Network externalities	Lock-in effect of installed base helps the pioneer (P_1)	Customer inertia because of wait-and-see attitude hurts the pioneer (P_2, supported)
Network externalities × radicalness of product	Radicalness creates window of opportunity for pioneer to leverage network externalities quickly (P_3, supported)	Low performance–price ratio slows acceptance of radical products, creating a window of opportunity for later entrants (P_4)
Network externalities × technological intensity of product	The need to integrate multiple types of technologies slows down later entrants, enabling the pioneer to leverage network externalities (P_5, supported)	Fast-changing product designs make pioneer's product obsolete, enabling later entrants to enter with an improved product design (P_6)
Network externalities × size of pioneer	Access to resources and complementary assets helps the pioneer leverage network externalities (P_7, supported)	Bureaucratic inertia of a large pioneer slows down product marketing, which enables later entrants to leverage network externalities (P_8)
Network externalities × incumbency of pioneer	Access to market knowledge and existing customer networks helps the pioneer (P_9)	Incumbent inertia and threat of cannibalization of existing products slows the incumbent, providing opportunities for later entrants (P_{10}, supported)

article Second, we limit our focus to products introduced after World War II, because World War II altered the business environment and the postwar period witnessed the emergence of new technologies (e g , computing, electronics, telecommunications) that were different in scope and character from those (e g , mechanical, electromechanical) introduced previously (Teitelman 1994) Third, because of our interest in the survival of pioneers and not the survival of products, we excluded products that did not succeed (e g , minidisc players) This criterion is consistent with our focus on the survival of pioneers in products demonstrated to be viable, substantive, and managerially relevant On the basis of these three criteria, we identified 63 office products and consumer durables

We used the historical method (Golder 2000) to collect data on the pioneer's time of entry, survival, characteristics, and technological intensity of the product For each product, we obtained information about the pioneer from articles published in scholarly journals, company histories, and online business databases When it was possible, we used multiple sources to increase the reliability of our data We were able to collect reliable information about the product, the dates of pioneering, and the survival of pioneers for 45 of the 63 product categories (Table 2) The products we studied span more than 50 years and include all major innovations in office products and consumer durables during this period

Our 45 products compare favorably in terms of number with those used in recent studies (Chandy and Tellis 2000, Golder and Tellis 1993, 1997, Sultan, Farley, and Lehmann 1990) In addition, the set of products in our study overlaps with 12 of the 16 new (introduced after 1945) consumer durables studied by Golder and Tellis (1997), 9 of the 10 new durables and office products studied by Golder and Tellis (1993), and 20 of the 25 new consumer durables and office products studied by Chandy and Tellis (2000) All the data are from publicly available data sources

Measures

Pioneer survival Our dependent variable is the survival duration of a pioneer in the product market it pioneered, which is measured in number of years We used 2001 as the cutoff year for measuring pioneering survival Because several pioneers (n = 21) were in existence in 2001, our survival data are right-censored at 2001 [5]

Network externalities There are no established measures for our key construct of network externalities Thus, using two independent sets of raters to assess the reliability of the measures, we developed a new measure A review of previous research (e g , Frels, Shervani, and Srivastava 2003, Shankar and Bayus 2003), case studies (e g , McGahan, Vadasz, and Yoffie 1997), and our discussions with managers indicated that network externalities are a matter of degree and are not dichotomous (i e , present or absent) and that a product can have direct network externalities, indirect network externalities, or both We conceptualize the degree of network externalities as a continuous variable that represents both direct and indirect externalities We used two groups of raters to measure the degree of network externalities (1) academic experts (12 professors at nine business schools who are recognized experts on organizational innovation or high-technology products or network externalities) and (2) MBA students (a class of 26 MBA students who had recently completed an elective course on high-technology marketing strategy) We provided the raters with a definition of direct and indirect network externalities and then asked them to rate separately the degree of direct and indirect network externalities associated with each product on a 1 (no network externalities) to 7 (very high network externalities) scale We computed the degree of network externalities for each product from each rater by adding the scores for direct and indirect network externalities We computed the reliability of the raters by computing reliability coefficients and eliminating raters (3 academic experts and 5 MBA students) who had item-to-total correlations of less than 40 The intraclass reliability coefficient (Shrout and Fleiss 1979) for the ratings provided by each group of raters (academic experts = 91, MBA students = 95) showed that the measures provided by both the retained academic experts and the students are internally consistent The average measures of degree of network externalities the two groups of raters provided are highly correlated (86, $p < 01$) To assess discriminant validity, we followed the procedure that Campbell and Fiske (1959) suggest Specifically, we compared the correlations for the network externalities measure across raters (for the same product) with the interrater correlations across products (for the same rater), we found the latter correlations to be small (ranging from 15 to 35)

To bolster our confidence in the ratings measure of network externalities, we also obtained ratings from eight marketing managers, and we found that the ratings provided by the managers were internally consistent (intraclass reliability coefficient = 89) and correlated well with the ratings provided by the academic raters (83, $p < 01$) We subsequently used the ratings data from students and managers separately to estimate our model, and, because we found consistent results, we report results based on the data from the academic experts

Radicalness of product We used Chandy and Tellis's (2000) radicalness scale, which has two dimensions (1) whether a new product incorporates a substantially different core technology (technology radicalness on a scale from 1 to 9) and (2) whether a new product provides substantially higher customer benefits compared with the previous product generation in the category (benefits radicalness on a scale from 1 to 9) We developed a radicalness measure by adding the two scores We followed a similar procedure for radicalness as we did for network externalities, using both academic and graduate student raters Our academic raters were 10 professors who are experts on organizational innovation (a different group from that used to rate network externalities), the student raters were 19 midlevel engineer executives enrolled in a master's of technology management

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[5] In a few cases, the pioneer (e g , Polaroid's instant photography) is a single-product company, but in most cases, pioneers are multiproduct firms with several business units In cases in which the pioneer is a multiproduct firm, we measured the survival duration of the pioneer in the focal product that it pioneered (Mitchell 1991)

TABLE 2
Description of Products (n = 45)

Product (1)	Network Externalities[a] (2)	Previous Product Generation (3)	Market Pioneer (Year of Entry) (4)	Status of Pioneer (Year of Exit) (5)	Current Market Leader (Year of Entry) (6)
Antivirus software	6 8	—	Symantec (1982)	Survived	**Symantec**
Audiocassette player	9 3	Spool audio player	Philips (1962)	Survived	Panasonic
Automatic teller machine	8 9	Bank teller	Docutel (1967)	Failed (1986)	Diebold (1970)
Computer-aided design software	6 8	Manual drafting	Autodesk (1982)	Survived	**Autodesk**
Camcorder	6 1	16 mm movie camera	Kodak (1984)	Failed (1987)	Sony (1985)
CD player	9 3	Audiocassette player	Sony (1982)	Survived	**Sony**
CD-ROM drive	9 3	3 5 inch floppy disk drive	Sony (1984)	Survived	L G Electronics (1989)
Cellular telephone	10 0	Telephone	AT&T (1979)	Survived	Verizon
Color television	8 4	Black-and-white television	RCA (1953)	Survived	**RCA**
Cordless telephone	4 3	Corded telephone	Keytronics (1975)	Failed (1979)	Vtech (1991)
Database software	9 6	Programming	Ashton-Tate (1981)	Failed (1991)	Microsoft (1992)
Desktop publishing software	8 7	Print typesetting	Aldus (1984)	Survived as Adobe	QuarkXPress (1987)
Digital camera	6 2	35 mm camera	Logitech (1991)	Survived	Sony (1997)
Dot matrix printer	6 0	—	Seikosha (1964)	Failed (1979)	Okidata (1972)
Digital videodisc player	9 4	VCR	Toshiba (1996)	Survived	Sony (1997)
Electric toothbrush	3 4	Manual toothbrush	Squibb (1960)	Failed (1968)	Oral-B (1978)
Fax machine	10 6	Telegraph	Magnavox (1960)	Failed (1965)	Sharp (early 1980s)
Flat-bed scanner	6 6	—	Kurzweil Technologies (1978)	Taken over by Xerox (1979)	Visioneer (1994)
Food processor	4 1	Mixer	Cuisinart (1972)	Survived	Hamilton-Beach (1955)
High-definition television	8 4	Color television	Zenith (1998)	Survived	**Zenith**
Home microwave ovens	5 8	Electric/gas range	Tappan (1955)	Failed (1985)	Sharp (1974)
Home VCR	9 4	16 mm home projection system	Sony (1975)	Survived	RCA/Matsushita (1977)
Ink-jet printer	6 2	Dot matrix printer	Hewlett-Packard (1984)	Survived	**Hewlett-Packard**
Instant photography	5 4	35 mm camera	Polaroid (1948)	Survived	**Polaroid**
Internet browser	7 6	—	Netscape/Mosaic (1994)	Failed (1998)	Microsoft (1995)
Internet service provider	10 1	—	Compuserve (1980)	Failed (1997)	America Online (1985)
Laser printer	6 2	Dot matrix printer	IBM (1975)	Survived	Hewlett-Packard (1984)
Mainframe computer	9 3	Punched card machine	Univac (1946)	Failed (1986)	IBM (1953)
Notebook computer	8 7	Desktop computer	Teleram Communications (1980)	Failed (1985)	Dell Computers (1984)
Operating system for personal computer	12 1	—	Digital Research (1976)	Failed (1996)	Microsoft (1981)
Personal data assistant	10 7	Electronic organizer	Amstrad (1993)	Failed (1995)	Palm Computers (1996)
Pager	7 4	Telephone	Motorola (1974)	Survived	Cobra
Personal computer	9 0	Minicomputer	MITS (1975)	Failed (1979)	Dell Computers (1984)
Personal finance software	6 8	Manual accounting	Dollars and Sense (1982)	Failed (1986)	Quicken (1984)
Photocopier	4 7	Cyclostyling	3M Thermofax (1950)	Failed (1962)	Canon (1969)
Pocket calculator	3 4	Manual calculation	Bowmar (1971)	Failed (1975)	Texas Instruments (1972)

TABLE 2
Continued

Product (1)	Network Externalities[a] (2)	Previous Product Generation (3)	Market Pioneer (Year of Entry) (4)	Status of Pioneer (Year of Exit) (5)	Current Market Leader (Year of Entry) (6)
Presentation software	7 1	Overhead 35 mm slide	Harvard Presentation Graphics (1986)	Survived	PowerPoint (1993)
Projection television	5 6	Overhead 35 mm slide	Advent (1973)	Failed (1981)	InFocus (1986)
Single-use camera	4 4	35 mm camera	Fuji (1986)	Survived	**Fuji**
Spreadsheet software	10 2	Minicomputers	Software Arts (1979)	Failed (1983)	Microsoft (1985)
Telephone answering machine	4 3	Manually answering telephone calls	Code-A-Phone (1958)	Failed (1993)	Panasonic (early 1970s)
3 5 inch floppy disk drive	9 1	5 25 inch floppy drive	Sony (1981)	Survived	LG Electronics (1989)
Videogame	9 4	Arcade game	Magnavox (1971)	Failed (1980)	Sony (1991)
Word processing software	10 4	Typewriter	MicroPro International (1979)	Failed (1995)	Microsoft (1989)
Workstation	9 6	Minicomputer	Three Rivers (1980)	Failed (1983)	Sun (1982)

[a] Network externalities ratings are provided by academic expert raters, scale ranges from 2 to 14

Notes If the pioneering firm did not survive and exited the market, the figure in parentheses in Column 5 denotes the year the pioneer exited the market If the pioneer has survived and was a market leader in its category in 2001, it is depicted in bold in Column 6 program at a leading university. We computed the reliability of the raters by computing reliability coefficients and eliminating raters (1 academic expert and 2 graduate students) who had item-to-total correlations of less than .40. Our retained academic experts had intragroup reliability ratings of .76, and the graduate students had intragroup reliability ratings of .84, which indicates acceptable internal consistency. As occurred previously, the average ratings from the two groups were highly correlated (.88, $p < .01$). We estimated the model with ratings from both groups of raters, we found consistent results, and we again report results based on data from the academic raters.

Technological intensity of product. To measure the technological intensity of products, we follow Hadlock, Hecker, and Gannon (1991) and use a categorical variable that classifies a product as technical or nontechnical on the basis of the ratio of the number of research and development employees to total personnel of the firms in the product category (for examples of the use of this measure, see Agarwal 1996; Agarwal and Bayus 2002). Of the 45 products, we classified 28 as technologically intensive.

Size of pioneer. Although a firm's size can be measured in several ways, including number of employees, sales volume, and total assets, the most common measure used in the innovation literature is number of employees (Cohen 1995). Because alternative definitions usually yield similar results (Agarwal 1979), we measured size by the number of firm employees at the time of pioneering, and we investigate two such measures: the actual number of employees and a dichotomous variable (small–large) split at the median firm size of 100 employees. For publicly traded firms, we obtained the size information from the COMPUSTAT database. For privately held firms, we obtained the size information from company directories and news archives. Using this method, we classified 25 of the 45 firms as small. We estimated the model with both the dichotomous and the continuous measure of size, and we found similar results. We report results based on the categorical measure because it is more robust and less subject to the influence of extreme values.

Incumbency of the pioneer. We follow the definition of incumbent that has been used in previous research (Chandy and Tellis 2000; Mitchell 1991; Mitchell and Singh 1993) and define a pioneer as an incumbent if it also markets a product belonging to the previous generation of products that satisfied the same customer need. We determined the previous product generation by using historical methods and academic experts. In six cases, the experts determined that there was no previous product generation that satisfied the particular customer need. The third column of Table 2 provides the previous product generation that we used to determine incumbency of the pioneer. We coded an incumbent pioneer as 1 and a nonincumbent pioneer as 0. Of the pioneers we studied, 19 were incumbents.

Model

Pioneer survival times cannot be analyzed by standard regression approaches because such data are typically right-censored (i.e., not all pioneers have failed by the time of the study). In 2001, the cutoff time for our study, 21 of the 45 pioneers continued to be in business. We used the AFT model, which accommodates right-censoring, to investigate the effects of network externalities and the moderation effects of product and firm characteristics on the effect of network externalities on the survival duration of pioneers (Cox and Oakes 1984; Helsen and Schmittlein 1993; Kalbfleisch and Prentice 1980). We provide an outline of AFT models, based on which we specify the following estimation equation, in the Appendix:

$$(1)\qquad Ln(T_i) = \mu + \beta_1X_{i1} + \beta_2X_{i2} + \ldots \beta_kX_{ik} + \sigma\varepsilon_i,$$

where T_i is the number of years firm i has been in existence in the product category as of 2001, and X_i is the vector of the covariates associated with the pioneering product introduced by firm i. The covariates used in the model are time invariant and include network externalities and the moderation effects of the two product and the two firm characteristics on the effect of network externalities on pioneer survival, which we described previously. If the results indicate that a particular sign is significant (e.g., a negative sign for incumbency × network externalities), our data support the corresponding form of the proposition (in this case, negative). For completeness, we also include the main effects of product and firm characteristics as covariates in the model. The error distribution ε_i has an extreme value density function ($f[\varepsilon_i] \sim \exp[\varepsilon_i - e^{\varepsilon_i}]$), μ, β, and σ (a scaling factor for the variance of the error term) are parameters to be estimated. In addition, we included the logarithm of the introduction year as a covariate. We also reestimated the model by including the time of the introduction year as a covariate, and we obtained similar results. We estimated Equation 1 by using maximum likelihood methods implemented in the SAS LIFEREG procedure.

Results

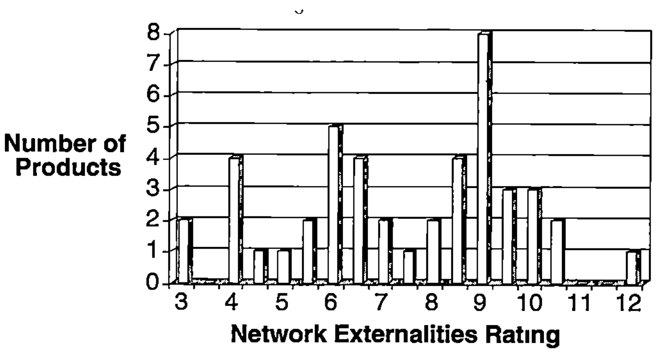
Descriptive Statistics of Products

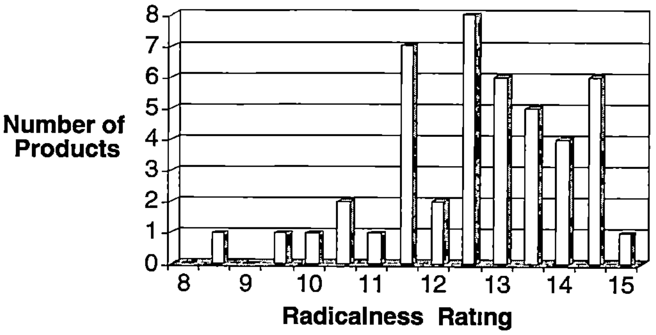
Table 2 contains the network externalities ratings, and Figure 2 contains the histograms of the network externalities and radicalness ratings for the products in our study. The dispersion of the rating scales for network externalities and radicalness suggests that the raters view the two constructs as continuous rather than dichotomous. Although possible values for the network externalities measure range from 2 (no network externalities) to 14 (high network externalities), the ratings of the products we studied ranged from 3.4 (electric toothbrush) to 12.1 (operating system for personal computers), with a mean of 7.7 and a standard deviation of 2.2. The radicalness ratings, with possible scale values from 2 to 18, ranged from 8.9 (electric toothbrush) to 15.3 (photocopiers), with a mean of 12.8 and a standard deviation of 1.4, which indicates moderate to substantial innovativeness for the products in the study.

Performance of Pioneers and Current Market Leaders

Of the 45 pioneers, 24 (53%) exited the market by 2001, which compares well with the 50% failure rate for the digital/high-technology products reported by Tellis and Golder

FIGURE 2
Histograms of Network Externalities and Radicalness Ratings





Notes: For network externalities ratings, the scale ranges from 2 to 14, with a mean of 7.7 and a standard deviation of 2.2. For radicalness ratings, the scale ranges from 2 to 18, with a mean of 12.8 and a standard deviation of 1.4.

(2000, p. 43). The average survival duration for the pioneers we studied was 11 years. The average market share for the surviving pioneers is 25%, and only 18% (n = 8) of the pioneers were leaders in the products they pioneered, with an average market share of 47%. The average market share of 25% for surviving pioneers is much higher in our study than that (8%) obtained by Tellis and Golder (2001, p. 44) for digital and high-technology products. We examined the correlations between market shares of all pioneers and the degree of network externalities and found a nonsignificant, negative relationship (ρ = –.14, not significant), but we found a positive relationship between the market shares of current market leaders that are not pioneers and the degree of network externalities (ρ = .30, $p < .10$). When we performed a median split of the network externalities scale, we found that the 10 surviving pioneers of the products with high network externalities had a market share of 19% compared with the 31% market share of the 11 surviving pioneers that introduced products with low network externalities. The average market share for the 24 later entrants that are current market leaders is 41%, compared with 25% for the surviving pioneers. The average lag in time of entry between the pioneer and the later-entry current market leaders is 8 years. In summary, an aggregate level analysis of the data suggests that there is a negative effect of network externalities on the performance of pioneers and that later entrants are not disadvantaged in relation to pioneers in terms of either survival duration or market share.

Model Estimation Results

We were interested in determining whether the base hazard rate (i.e., the instantaneous probability that the pioneer will fail at time t) was constant, increasing, or decreasing with time, so that we could investigate a pioneer's risk of failure over time. We considered alternative base hazard functions, including the exponential, gamma, log-normal, log-logistic, and Weibull, for which the AFT method allows, and we used a multistep approach to determine the distribution that best represents the survival times of pioneers in networked markets. We were unable to estimate the gamma model with our data because of convergence problems that were partly due to the small sample size. However, the gamma model often displays convergence problems, even if it is estimable, it is difficult to judge the shape of the hazard function from the estimated parameters (Allison 1995, p. 74). We estimated the exponential model, which assumes a constant hazard rate (a special case of the Weibull model, with scale parameter set to 1), and we found that this model can be rejected ($p < .001$). Therefore, using three distribution functions (log-normal, log-logistic, and Weibull) that accommodate a changing hazard rate, we estimated the model in Equation 1 with the results reported in Columns 1–3 of Table 3.

Although the general pattern of results is similar across the models, based on the Akaike information criterion (AIC), the model estimated with the Weibull hazard function fits the data slightly better than those estimated with the log-normal and the log-logistic functions. The Weibull model can be interpreted as both a (parametric) proportional hazards model and an AFT model (see the Appendix). We also present the results of the Cox proportional hazards model in Column 4 of Table 3. The sign reversals of the estimates for this model compared with the AFT models occur because the proportional hazards model estimates the effects on hazard rate, whereas the AFT model estimates the effects on survival times. By multiplying the Weibull parameter estimates for the AFT model in Table 3 by ($-1/\sigma$), we obtained the estimates of the proportional hazards model with a Weibull distribution of survival times. With this transformation, the general pattern of results from the Weibull and the Cox proportional hazards models is similar. However, in terms of the AIC, the overall fit of the proportional hazards model is inferior to that of the Weibull AFT model; therefore, we discuss only the results of the AFT model.

The model χ^2 statistic is significant ($\chi^2 = 24.74$, degrees of freedom [d.f.] = 10, $p < .01$), and the scale parameter of the model is .62, which indicates that the hazard rate for pioneer survival decreases over time (i.e., the longer the pioneer has survived, the greater are its chances of continued survival). Our results indicate that network externalities have a negative effect on the survival duration of pioneers (b = –2.38, $p < .01$), suggesting that the higher the level of network externalities, the shorter is the survival duration of the pioneer (in support of P_2). Both for more radical products (b = .14, $p < .01$) and for more technologically intensive products (b = .42, $p < .05$), network externalities increase the

TABLE 3
Results of Model Estimation of Effect of Network Externalities on Pioneer Survival

	Log-Normal Distribution (1)	Log-Logistic Distribution (2)	Weibull Distribution (3)	Proportional Hazards (4)
Variable	**Parameter Estimates (Standard Error)**	**Parameter Estimates (Standard Error)**	**Parameter Estimates (Standard Error)**	**Parameter Estimates (Standard Error)**
Intercept	19 71 (6 05)***	19 52 (6 63)***	23 12 (5 68)***	—
Product-Level effects				
Network externalities	–1 94 (84)*	–1 94 (95)**	–2 38 (83)***	3 25 (1 42)**
Radicalness of product × network externalities	11 (06)*	11 (05)*	14 (05)***	– 18 (09)**
Technological intensity of product × network externalities	42 (19)*	39 (20)*	42 (18)**	– 62 (30)**
Firm-Level Effects				
Size of pioneer × network externalities	70 (30)**	70 (37)**	89 (29)***	–1 20 (48)**
Incumbency of pioneer × network externalities	– 90 (33)	– 94 (34)***	–1 03 (33)***	1 35 (55)**
Controls				
Radicalness of product	– 80 (36)**	– 82 (37)**	–1 00 (31)***	1 35 (55)**
Technological intensity of product	–2 89 (1 32)**	–2 67 (1 44)*	–3 10 (1 23)**	4 49 (2 06)**
Size of pioneer	–4 34 (1 86)**	–4 34 (1 96)**	–5 67 (1 78)***	7 14 (3 02)**
Incumbency of pioneer	6 31 (2 16)***	6 68 (2 29)***	7 36 (2 33)***	–9 91 (3 88)**
Log (introduction year)	– 82 (28)	– 83 (29)***	– 81 (26)***	1 03 (49)**
Scale parameter	86	51	62	—
Model χ^2 (d f = 10)	18 80 ($p =$ 05)	19 54 ($p =$ 05)	24 74 ($p =$ 01)	18 13 ($p =$ 05)
AIC	104 42	105 48	103 46	157 26

*$p <$ 10
**$p <$ 05
***$p <$ 01

survival duration of pioneers (in support of P_3 and P_5) For larger firms, network externalities increase survival duration (b = 89, $p <$ 01, in support of P_7), whereas for incumbent pioneers, network externalities decrease survival duration (b = –1 03, $p <$ 01, in support of P_{10}) In our model, we also observed several unhypothesized main effects for radicalness, technological intensity, size, and incumbency Table 1 links these empirical findings to our conceptual arguments

Although the magnitudes of the coefficients are not directly informative, a simple transformation provides an intuitive interpretation For a continuous variable such as network externalities, the transformation $100(e^b - 1)$ gives the percentage change in the expected survival time for each unit increase in the variable Thus, $100(e^{-2\,38} - 1) = -91\%$ indicates the percentage decrease in the expected survival time for each one-unit increase in the degree of network externalities, when other covariates are held constant The order of magnitude for the effects is similar to those obtained in other AFT studies of firm survival For example, Mitchell and Singh's (1993) study of the effects of expansion into new technical subfields on survival in a firm's base business reports similar effect sizes (b = 1 78) for the expansion effect Note that the coefficient value is a statistical estimate, and given its 95% confidence interval (i e , – 75 to –4 01), the corresponding change in survival duration ranges from –53% to –98% Note that in the presence of statistically significant moderation effects in the model, the main effect does not represent the full impact of changes to survival duration associated with a change in the degree of network externalities

By excluding network externalities and only retaining the main effects of the two products, the two firm characteristics, and time, we also examined the power of network externalities in explaining the survival duration of pioneers ($\chi^2 = 9\ 78$, d f = 5, $p <$ 10) The difference in the model χ^2 statistic between the reduced model and the complete model (Column 3, Table 3), which includes network externalities and all the moderating effects, is significant ($\chi^2 = 14\ 96$, d f = 5, $p =$ 01) We also estimated a model that retained only the main effects of all explanatory variables, excluding all the moderating effects, and we found that the difference in the model χ^2 statistic between the reduced model and the complete model (Column 3, Table 3), which includes network externalities and all the moderating terms, is significant ($\chi^2 = 14\ 34$, d f = 4, $p <$ 01) The results suggest that a model that includes network externalities and the moderating effects of product and firm characteristics provides a significantly improved explanation of pioneer survival over models that exclude network externalities and the moderating effects

Robustness of Results

Definition of exit. Not all pioneer failures we studied were unambiguous exits from the product market. In two cases (Aldus's desktop publishing software and Kurzweil Technology's flat-bed scanner), other firms (Adobe and Xerox, respectively) acquired the pioneer. In both cases, we treated the exit as a censored exit. In eight other cases (e.g., mainframe computers, database software), the pioneer failed in the market in which it pioneered, but another firm took over the related assets. The appropriate approach is to estimate a model of competing risks to determine the effects of covariates on the multiple types of exits (Allison 1995, p. 185). However, the small number (ten) of ambiguous exits precludes such an approach. Thus, we reestimated the model, excluding the ten pioneers (n = 35) with ambiguous exits (Column 1, Table 4). The model χ^2 statistic is significant ($\chi^2 = 23.40$, d.f. = 10, $p < .01$), and the scale parameter of the model is .65. The general pattern of results with this smaller sample is consistent with the ones we obtained with the inclusion of the ambiguous exits.

Censoring date. An assumption of duration models is that censoring is conditionally independent of the event and the covariates. For our analysis, we used the full information in the data set and censored the survival of the pioneers in 2001. To explore whether the results were sensitive to the use of 2001 as the censoring date, we reestimated the model with three different censoring dates: 1998, 1995, and 1992 (Table 4). From the results in Columns 2–4 of Table 4, it is evident that the general pattern of results with the different cutoff years is similar to those we reported in Table 3.

Sample. Even though our sample size compares well with those of previous research (e.g., Chandy and Tellis 2000; Golder and Tellis 1993, 1997), it is small, and thus we performed a bootstrap analysis to examine sensitivity of our results to sampling variations (Efron 1979). We generated a list of 50 random numbers (with replacements) from 1 to 45. We then estimated Equation 1 50 times, each time with 44 observations, and we eliminated one observation that corresponded to the random number generated. The results of the bootstrapping analysis (Column 5, Table 4) indicate that our results are robust to sampling variations.

Differential effects of direct and indirect network externalities. We conducted an exploratory investigation by estimating a model that includes direct and indirect network externalities separately and their interactions (not reported herein). Although the overall pattern of results was similar to the results we obtained with the combined measure of network externalities, the effect of direct network externalities in that model was significant at $p < .10$, whereas the effect of indirect network externalities was not significant. The lack of statistical significance may be because neither direct nor indirect network externalities independently explain pioneering survival.

Academic expert ratings. To cross-validate our estimation results with the ratings of network externalities and radicalness from academic raters, we reestimated Equation 1 with the network externalities and radicalness ratings obtained from student raters and managers; we found results consistent with those we report herein. In summary, our results are robust to different definitions of exit, censoring dates, and other threats to validity, including sampling variations and the use of raters.

Conclusions

> First-mover advantages can be powerful and long-lasting in lock-in markets, especially those in information industries where scale economies are substantial. If you can establish an installed base before the competition arrives on the scene, you may make it difficult for later entrants to achieve the scale economies necessary to compete.
>
> —Shapiro and Varian 1998

> In the networked market, whoever gets a small, early advantage in a market may soon have a large, insuperable edge of increasing returns to scale due to the networked effects.
>
> —*Industry Standard*, September 19, 1999

Contrary to conventional wisdom about pioneering advantages in networked markets, our results indicate that network externalities significantly decrease the survival duration of pioneers. Increases in the marginal customer's utility over time and the excess inertia of customers adopting new products, both of which shorten pioneer survival, appear to outweigh the advantages associated with an installed base of customers that may prolong pioneer survival. In addition, the results of our analysis support a contingency-based framework of product and firm characteristics that moderate the effect of network externalities on the survival duration of pioneers.

Theoretical Contributions

The results of our study contribute to research in marketing strategy that explores market entry, network externalities, and high-technology markets.

Market entry. Our study adds to the limited research on the survival of pioneers (e.g., Golder and Tellis 1993; Mitchell 1991). In particular, our finding that network externalities reduce the survival duration of pioneers challenges the proposed empirical generalization that "order of market entry is not related to long-term survival rates" (Kalyanaram, Robinson, and Urban 1995, p. G218). By including network externalities and two product characteristics, we clarify the role of product characteristics in the performance of pioneers and address calls for research on this issue (Kerin, Varadarajan, and Peterson 1992; VanderWerf and Mahon 1997). In addition, by studying office products and consumer durables, we address the calls to extend pioneering research beyond the traditional contexts of packaged goods, pharmaceuticals, and the PIMS databases (Kalyanaram, Robinson, and Urban 1995; Lieberman and Montgomery 1998).

Network externalities. Extant theoretical economics literature on network externalities suggests that there are opposing processes of lock-in that result in market power potentially aiding the survival of the pioneer (Choi 1994) and in excess inertia that can hurt the pioneer's quest for survival (Farrell and Saloner 1986). The results of the negative main effect of network externalities on survival duration

TABLE 4
Robustness of Results to Ambiguous Exits, Different Censoring Dates, and Sampling Variations

Variable	(1) Excludes Ambiguous Exits (n = 35)[a] Parameter Estimates (Standard Error)	(2) Cutoff Year (1998; n = 44) Parameter Estimates (Standard Error)	(3) Cutoff Year (1995; n = 43) Parameter Estimates (Standard Error)	(4) Cutoff Year (1992; n = 41) Parameter Estimates (Standard Error)	(5) Estimates from Bootstrapping Parameter Estimates (Standard Error)
Intercept	29 59 (6 60)***	21 51 (4 85)***	17 86 (4 78)***	15 87 (3 84)***	22 94 (5 82)***
Product-Level Effects					
Network externalities	–3 51 (96)***	–2 33 (72)***	–1 99 (71)***	–1 44 (58)**	–2 36 (85)***
Radicalness of product × network externalities	19 (06)***	14 (04)***	13 (04)***	10 (04)***	14 (05)***
Technological intensity of product × network externalities	62 (21)***	41 (16)***	32 (16)**	17 (14) (N S)	42 (19)**
Firm-Level Effects					
Size of pioneer × network externalities	1 00 (30)***	75 (24)***	99 (25)***	73 (22)***	88 (30)***
Incumbency of pioneer × network externalities	–1 22 (45)***	– 94 (28)***	–1 35 (29)**	– 82 (22)***	–1 03 (34)***
Controls					
Radicalness of product	–1 23 (36)***	– 92 (27)***	– 82 (27)***	– 70 (21)***	– 99 (32)***
Technological intensity of product	–4 66 (1 58)***	–3 03 (1 12)***	–2 08 (1 08)*	–1 33 (91) (N S)	–3 08 (1 27)**
Size of pioneer	–6 80 (1 90)***	–4 84 (1 47)***	–5 36 (1 47)***	–4 35 (1 28)***	–5 65 (1 81)***
Incumbency of pioneer	9 58 (3 54)****	6 52 (1 94)***	8 39 (22)***	5 39 (1 48)***	7 36 (2 41)***
Log (introduction year)	– 75 (30)**	– 74 (22)***	– 67 (10)***	– 88 (20)***	– 81 (26)**
Scale parameter	65	52	51	40	62
Model χ^2 (d f = 10)	23 40 ($p <$ 01)	26 08 ($p <$ 01)	25 98 ($p <$ 01)	27 38 ($p <$ 01)	—

*$p <$ 10
**$p <$ 05
***$p <$ 01
[a]Sample excludes ten products for which the pioneering exit is ambiguous
Notes N S = not significant

of pioneers indicate that the negative excess inertia effects of network externalities outweigh the positive lock-in effects on the pioneer's survival duration

However, the moderating effects of product and firm characteristics on the effect of network externalities on the survival of pioneers qualify the previous case Pioneers of more radical and technologically intensive products in networked markets survive longer than pioneers in less radical and less technologically intense products Thus, it appears that though radical and technologically intensive product categories are risky for pioneers in networked markets (as evinced by the unhypothesized negative main effects for radicalness and technological intensity in Column 3, Table 3), the characteristics also provide entry barriers that mitigate that risk, thereby enabling the pioneer to establish an installed base, wield market power, and secure long-term survival

Large pioneering firms have access to complementary resources that enable them to establish an installed base and lock in customers to their product's network, positively influencing firms' long-term survival For incumbent pioneers, increases in network externalities decrease the duration of pioneer survival, a finding that is consistent with previous research on incumbents' inertia to invading innovations (e g , Ghemawat 1991, Henderson 1993, Mitchell 1991)

In summary, our findings indicate a notable and complex interplay of product and firm characteristics that determine the effect of network externalities on pioneer survival In our empirical analysis, we were able to elucidate the interplay of factors and explain the relationship between network externalities and market entry strategy (i e , pioneering), thereby extending the literature on marketing strategy for firms in networked markets (Gupta, Jain, and Sawhney 1999, Padmanabhan, Rajiv, and Srinivasan 1997)

High-technology markets As the first reported empirical investigation of market entry in high-technology markets, our study addresses a call for more research on marketing strategy issues in such markets (John, Weiss, and Dutta 1999, p 78) The unhypothesized negative main effects of products' radicalness and technological intensity on pioneer survival indicate that though pioneers of radical and technologically intensive products face considerable risks, the risks are mitigated by the presence of network externalities These findings point to the role of product characteristics in determining the rewards of pioneering in such markets and suggest that strategy researchers should consider these variables in future theory development in the domain

Managerial Contributions

Our findings provide several specific managerial insights First, network externalities have a strong negative effect on the survival duration of pioneers This finding suggests that firms contemplating entry into such markets should consider taking a wait-and-see approach to launch, allowing other firms to pioneer but readying to enter quickly if the market begins to take off Thus, it pays to be patient but watchful in those markets Indeed, for 12 of the 45 products we studied, the later entrant adopted standards set by the pioneer or an earlier entrant, piggybacking on the technological developments The later entrant firm thus learns vicariously about the product market before market entry, which is consistent with recent evidence for delaying new product entry (Narasimhan and Zhang 2000)

However, not all pioneers in networked markets failed, the surviving pioneers had average market shares of 25% Why do some pioneers survive and thrive while others fail? Our case histories suggest a possible explanation a focus on marketing the networked utility of the product The utility of a networked product to a customer derives from two sources (1) the intrinsic, or the stand-alone, utility of the product, independent of the number of other users of the product (e g , using a personal computer as a stand-alone computing device), and (2) the networked utility that results from other users in the physical (e g , fax machine) or virtual (e g , personal computer, CD player) network Pioneers of products with network externalities must not only market their products but also develop and market the product's network Firms can build network utility in different ways, including licensing of the product to other manufacturers to build a large installed base quickly to reduce customer uncertainty, promotion of the development of complementary goods (e g , CD music titles for CD players), and/or ensuring of backward compatibility with existing networks to reduce switching costs to the new network Pioneers that focused on promoting and delivering network utility to customers survived, but firms (whether pioneers or later entrants) that focused on only the stand-alone utility tended to fail

Consider Sony, which pioneered the CD player in 1982 Sony worked extensively to develop the CD format accepted by the music industry and entered into extensive licensing agreements for other firms to manufacture the CD player Sony also recognized that the availability of music titles on CDs was crucial for delivering utility to customers of the CD player, so it leveraged its Columbia Records label and its collaboration with Philips's PolyGram Records, two of the world's largest music producers at the time, to ensure the availability of music titles on CDs When Sony introduced its first CD player, Columbia Records simultaneously released the world's first 50 music CD titles (for other examples, see Liebowitz and Margolis 2001, Varian and Shapiro 1998)

Second, radicalness and technological intensity of the product moderate the effect of network externalities to increase the survival duration of pioneers Although radical and technologically intense product markets are risky, these product characteristics actually strengthen the pioneer's survival Consider again the CD player pioneered by Sony Because of its laser-based, computerized technology, the CD player offered virtually noiseless sound quality that was impossible to achieve with the prevalent audiocassette player, thereby providing a breakthrough in sound reproduction Not affected by the scratches, smudges, and heat warping that afflict audiocassettes, CDs maintained their original sound quality for a long time The CD player was revolutionary and, as an industry analyst (*San Diego Tribune* 1987, p B1) notes, was "the most dramatic development in sound reproduction since Edison" Thus, the radicalness of CD players resulted in formidable entry barriers for subsequent entrants, ensuring Sony's long-term market dominance

Third, firm size moderates the effect of network externalities to increase the survival duration of pioneers, and incumbency moderates the effect of network externalities to decrease the survival duration of pioneers Large firms can be assured that their size and attendant resources aid their pioneering efforts in networked markets, whereas it might be beneficial for small firms to partner with other firms that have the necessary resources for market development For example, Philips's large size and plentiful resource base proved useful in pioneering the audiocassette player market With respect to incumbency, incumbent pioneers in networked markets must guard against technological inertia, which hurts their survival

Limitations and Further Research

This study has some limitations that present opportunities for further research We focused on the survival duration of pioneers In some situations, pioneers may survive for a long period but not realize large market share or high profits We used firm size as a surrogate for organizational resources, and we did not measure the impact of specific resources (e g , size of the business unit, marketing mix) on the survival duration of pioneers Further research should investigate the effects of network externalities on other measures of pioneer performance, such as market share and financial performance, and incorporate the effects of the pioneers' other resource characteristics

We focused on the survival duration of pioneers, not on the survival of products Therefore, we restricted our attention to products that had mass-market acceptance We were unable to collect data for 18 products in smaller product markets (e g , radar detector) for which historical records were sparse Other researchers might extend our study to identify the pioneering rewards in a broader set of product categories

Given the lack of objective measures for network externalities and radicalness, we used retrospective, subjective measures Because of improved record keeping and contemporaneous accounts of new product innovations, future researchers can use measures that might not be subject to the possible hindsight biases of our subjective measures

In addition, we focused on two product and two firm characteristics as moderators of the effect of network externalities on pioneer survival A product characteristic that we did not consider is the appropriability of the innovation (Teece 1986), or the ability of the firm to collect rents for its innovation efforts In general, appropriability in the product categories we studied is low, because few firms appeared to rely on the protection afforded by patents Further research should investigate the effects of appropriability and other product and firm factors on the rewards to pioneers for products with network externalities

In summary, we view this study as a useful base for further investigation of the effects of network externalities on the performance of pioneering firms We hope our research stimulates additional work in the area

Appendix
Outline of AFT Models

A pioneer's time of failure, T (from time of product introduction), is a random variable that has a probability density function $f(T = t)$, denoted as $f(t)$, where cumulative density is represented by $F(t)$ The likelihood that a pioneer fails at time $T = t$, given that it has not failed in the time interval $[0, t)$, is $h(t) > 0$ The hazard function is $h(t)$ (i e , the risk of a firm failing at any give time t) and is equal to $f(t)/[1 - F(t)]$ All pioneers face a base hazard that represents the risk of failure in homogeneous (average) conditions Various covariates specific to each pioneering product (e g , firm size, type of product, moderation effects on network externalities) can increase or decrease the hazard (and, consequently, the survival duration) of pioneers

There are two main ways to estimate the effects of covariates on survival (1) use of nonparametric models to model their effect on the hazard (e g , Cox proportional hazards model) and (2) use of parametric models to model their effect on the duration time (e g , AFT models) The AFT models can accommodate several distributions (gamma, log-normal, log-logistic, Weibull, or exponential [a special case of Weibull]) for the hazard function Because we wanted to explore the specific form and shape of the hazard function that underlies the survival of pioneers, we used the AFT model The AFT method is well accepted in the fields of statistics, engineering, and sociology (see Allison 1995, Kalbfleisch and Prentice 1980, Lawless 1982) but has been used infrequently in marketing (e g , Bayus 1998, Manchanda et al 2002)

We illustrate the AFT model with an example Suppose that there are two firms that are identical in all respects except for group membership (0 and i) A firm in Group 0 with survival time t will have a survival time ϕt in Group i (i e , $S_0[t] = S_i[\phi t]$) For example, if Group 0 consists of large firms and Group i consists of small firms, it might be expected that $\phi < 1$ (i e , pioneers in Group i have an accelerated failure time) The hazard functions for the two groups then share the following relationship $h_i(t) = \phi h_0(\phi t)$ When incorporating the effects of covariates, we denote the hazard function as $h(t,X)$, where X is a set of covariates Furthermore, if we specify that ϕ is determined by a set of covariates ($\phi = e^{\alpha X_i}$), the hazard function for firms in Group i (compared with that of firms in Group 0) for the AFT model is

$$h_i(t,X_i) = e^{\alpha X_i} h_0(te^{\alpha X_i}) \tag{A1}$$

If firms in Group 0 have a Weibull distribution of survival times, $W(a, b)$, the distribution of survival times of firms in Group i is also Weibull, $W(ae^{b\alpha X_i}, b)$, so that firms have the same duration distribution conditional on X Likewise, if firms in Group 0 have a log-logistic distribution of survival times, $LL(\mu, \sigma)$, or a log-normal distribution, $LN(\mu, \sigma)$, the survival times of firms in Group i are given by $LL(\mu - \alpha X_i, \sigma)$ and $LN(\mu - \alpha X_i, \sigma)$, respectively For estimation of the parameters of the previous distributions, it is easier to work with the distribution of Ln(T) rather than T Therefore, we specify an estimation model as follows

$$\text{Ln}(T_i) = \mu + \beta_1 X_{i1} + \beta_2 X_{i2} + \quad \beta_i X_{ik} + \sigma\varepsilon_i, \tag{A2}$$

where the terms are described in the text

To determine the relationship between Equation A2 and the survival distribution, if it is assumed that T_i has a Weibull distribution, the correspondence between the parameters of $W(ae^{b\alpha X_i}, b)$ and the parameters of Equation A2 is as follows $b = 1/\sigma$, $a = e^{-(\mu/\sigma)}$, and $\alpha = -\beta$ In contrast, if it is assumed that T_i has a log-logistic distribution (equivalently, $Ln[T_i]$ has a logistic distribution), the correspondence between the parameters of $LL(\mu - \alpha X_i, \sigma)$ and Equation 2 is as follows $\mu = \mu$, $\sigma = \sigma$, and $\alpha = -\beta$ The correspondence between the survival time distribution and Equation 2 for log-normal is analogous to that of log-logistic

We also note that the Weibull model can be interpreted as both a proportional hazards model and an AFT model For Weibull W(a,b), the base hazard function is given by $h_0(t) = abt^{b-1}$ The hazard function for the AFT model per Equation A1 is $h_i(t, X_i) = e^{\alpha X_i}h_0(te^{\alpha X_i}) = e^{\alpha X_i}[ab(te^{\alpha X_i})^{b-1}] = (e^{b\alpha X_i})h_0(t)$ The last equation in this sequence of identities is the proportional hazards representation, the proportionality constant is equal to $e^{b\alpha X_i}$ Note also that $e^{b\alpha X_i} = e^{-(1/\sigma)\beta X_i}$ when it is represented in terms of the parameters of Equation A2, because $b = 1/\sigma$ and $\alpha = -\beta$

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Chuan-Fong Shih & Alladi Venkatesh

Beyond Adoption: Development and Application of a Use-Diffusion Model

The study tests a use-diffusion model in the context of home technology use The authors combine two constructs, variety and rate of use, to yield four user segments The results show that user segments vary on the basis of social context and technological makeup of the household as well as personal factors and external influences Furthermore, user segments differ with regard to users' satisfaction with technology and interest in acquiring future technologies

In the field of marketing, research on new product diffusion has traditionally focused on the adoption perspective (Dickerson and Gentry 1983, Mahajan and Muller 1979, Midgley and Dowling 1978, Rogers 1995) We label this the adoption-diffusion (AD) paradigm, which examines the process by which an innovation reaches a critical mass of adopters, the diffusion is accelerated, and innovation is considered successful (Mahajan, Muller, and Bass 1990) Recently, researchers have pointed out the limitations of the AD model, stating that though diffusion processes cannot be understood without studying the nature of adoption, to complete the diffusion story, use-diffusion (UD) processes also need to be examined (Anderson and Ortinau 1988, Golder and Tellis 1998, Lewis and Seibold 1993, Roberston and Gatignon 1986) [1] This is especially true of some consumer technologies for which their complexity and evolving nature indicate that the trajectory and time scale of diffusion can be quite prolonged Accordingly, our current research extends the diffusion concept further with a systematic study of postadoption UD We believe that the UD framework offers some motivating theoretical and managerial implications for ongoing research in this area and for market segmentation and product development The specific research questions in this study are as follows (1) What are the characteristics of UD? (2) What are the determinants and outcomes of UD? (3) Given that users might display different use patterns in terms of variety and rate of use, how can users be classified into meaningful categories? and (4) How can the results of our study of UD provide insights or input into market segmentation and new product strategies? To address these research questions, we propose and test a model of UD that can be applied to a range of consumer durables with multiple applications Examples include, but are not limited to, computer hardware and software, wireless telephones, personal data assistants, home entertainment systems, videogame consoles, and "smart" home appliances

UD Theory and Model Description

Before we present the theoretical UD model, we briefly discuss the underlying structural differences between AD and UD (see Table 1) The variable of interest in the AD model is rate or time of adoption, in the UD model, the variable of interest is use or, more specifically, rate of use and variety of use

The theoretical considerations for the AD model include an S-shaped diffusion curve, speed of penetration and critical mass, and a two-step model of diffusion The corresponding theoretical elements for the UD model are the evolving nature of use (rate and variety), sustained continuous use (or disadoption), and technology outcome considerations (technology integration, perceived essentialness of technology, impact of technology, and user proneness to adopt new technologies)

The standard diffusion theory states that the diffusion curve is divided into three stages (1) introduction, (2) growth, and (3) maturity The theory further states that along the diffusion curve lies a typology of adopters (innovators, early adopters, early majority, late majority, and laggards) In the UD model, the proposed categories (which we elaborate on in the next section) are intense users, specialized users, nonspecialized users, and limited users

The models share some common constructs (innovativeness, social communication, complexity, media influence, and relative advantage), however, these constructs may not be identical in their content For example, adopter innovativeness is not the same as use innovativeness (Price and Ridgeway 1983) There are also criteria that differentiate the models Unique to the AD model are observability, compatibility, and trialability (Rogers 1995), whereas the UD

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[1] To quote Robertson and Gatignon's (1986, p 3, emphasis in original) seminal article, "[T]he speed of diffusion of technological innovation depends on the consumer's ability to develop new knowledge and new patterns of experience   Because the emphasis is on technological innovation, adoption is not the only relevant concern of diffusion research The *degree of use* of that technology is an important variable that describes the extent of diffusion of that innovation "

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TABLE 1
Comparing Characteristics of Adoption-Diffusion and Use-Diffusion

	Variable of Interest	Typology of Population	Relevant Criteria	Elements Unique to Each Model	Elements Common to Both Models
AD	Adoption	Innovators Early adopters Early majority Late majority Conservatives	Timing or rate of adoption	Observability Compatibility Trialability	Innovativeness Social communication Complexity Influence of media Relative advantage
UD	Use	Intense users Specialized users Nonspecialized users Limited users	Rate of use Variety of use	Product experience Competition for use Sophistication of technology Satisfaction	

model includes experience with technology (positive and negative), competition for use (among multiple users), sophistication of technology, and satisfaction from use

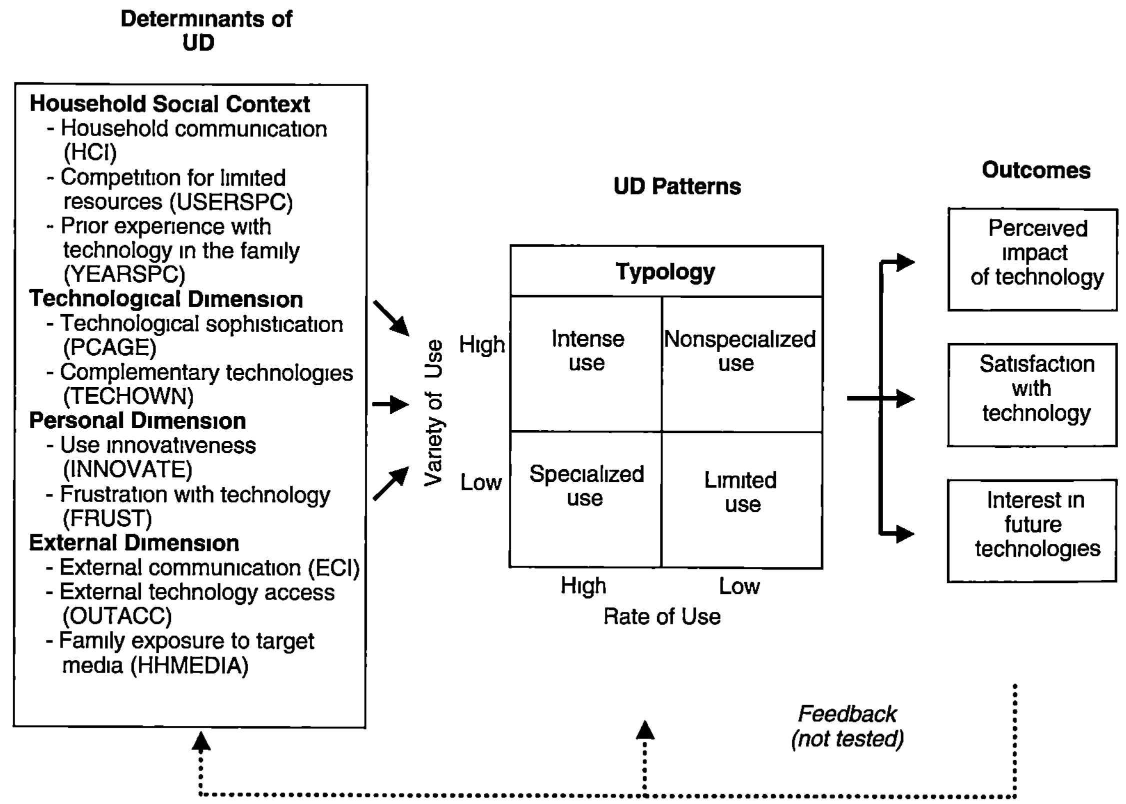
A Conceptual UD Model

The conceptual model that guides our work is presented in Figure 1 The model has three key components (1) UD determinants, (2) UD patterns, and (3) UD outcomes Each of these components has some subcomponents Although all three components are integral to our model, UD patterns (i e , the typology of uses or, derivatively, typology of users) occupy a special place in the model because of the key role they play in UD We therefore begin with use patterns

UD Patterns

We conceptualize usage as comprising two distinct dimensions variety of use and rate of use *Variety of use* refers to the different ways the product is used *Usage rate* refers to the time a person spends using the product during a designated period Although it is conceivable that variety and use are correlated (i e , the higher the variety, the higher the rate is), their exact relationship has not been empirically examined However, Ram and Jung (1990) and Ridgeway and Price (1994) note that a higher rate without a higher variety of use may signal routinized needs Furthermore, different antecedent factors may influence rate and variety of use, and thus they should be treated as distinct

FIGURE 1
Use-Diffusion Model


Determinants of UD
Household Social Context
- Household communication (HCI)
- Competition for limited resources (USERSPC)
- Prior experience with technology in the family (YEARSPC)
Technological Dimension
- Technological sophistication (PCAGE)
- Complementary technologies (TECHOWN)
Personal Dimension
- Use innovativeness (INNOVATE)
- Frustration with technology (FRUST)
External Dimension
- External communication (ECI)
- External technology access (OUTACC)
- Family exposure to target media (HHMEDIA)
UD Patterns
Typology
Variety of Use
High
Low
Intense use
Nonspecialized use
Specialized use
Limited use
High
Low
Rate of Use
Outcomes
Perceived impact of technology
Satisfaction with technology
Interest in future technologies
Feedback (not tested)

The combination of variety (low/high) and rate (low/high) yields a fourfold typology of use or users (Figure 1) intense, specialized, nonspecialized, and limited[2] *Intense use* describes situations in which an innovation is used to a significant degree in terms of both variety of use (time spent per week) and rate of use (number of applications) With *specialized use*, the focus shifts to increasing rate of use Such usage behavior essentially treats the innovation as a specialized tool (Tinnell 1985) *Nonspecialized use* refers to a pattern of use in which variety of use is more critical than rate of use Such a pattern best (though not exclusively) describes usage based on trial and error Finally, *limited use* refers to low variety of use and low rate of use, that is, users find little, if any, worthwhile application potential and therefore relegate the product to a relatively minor role, even to the point of "disadoption" (Lindolf 1992)

Note that the fourfold typology we have put forward has face validity because it distinguishes four types of users on the basis of use characteristics, which is the focus of our study Note also that at any given time, the typology represents mutually exclusive sets of user segments (i e , a user can belong to only one category), however, user identities need not be fixed over time (i e , users can move from one category to another given their needs and other situational factors) For example, an intense user may settle down to a routine of limited use over time and thus be reclassified as a specialized user Such movements between segments are not uncommon in a marketing context, as is noted in psychographic research in which people undergo lifestyle changes and move from one category to another

We present four dimensions that may affect the patterns of use we have described (1) the household social context in which the user operates, (2) the technological dimension (characteristics associated with the innovation), (3) the personal dimension (e g , use innovativeness), and (4) external factors (external communication and media exposure)

Rate of use represents temporal patterns of use and depends on the user's specific needs at a given point in time and is less influenced by interactions with others If a person needs to do more of the same thing that he or she has been doing, that person knows the basis of his or her activity and has less reason to communicate with others However, if the person is engaged in different activities in connection with technology, he or she is probably exploring different possibilities and thus may want to communicate with others because of limits to his or her own knowledge Variety of behavior implies a process of discovery and thus offers a greater scope for innovativeness We place variety of use on a slightly higher plane than rate of use because it represents a more complex behavior and involves a higher cognitive effort This distinction has motivated the way we postulate different hypotheses in our study

Household Social Context

The marketing literature recognizes the importance of the social context as a key aspect of diffusion (Fisher and Price 1992) The household social context consists of three variables (1) household communication, (2) competition for limited resources, and (3) prior experience with technology

Household communication Literature on diffusion of innovation has always stressed the importance of interpersonal communication (e g , Kraut et al 1998, Valente 1995), Dodson and Muller (1978) have shown the key role of word-of-mouth communication in the diffusion process Communication can be quite intensive in close-knit groups (e g , families) (Reingen and Kernan 1986) When the user can discuss questions with others, particularly with more knowledgeable users, information can be quickly exchanged to overcome difficulties in using the technology (Kiesler et al 2001) In contrast, when users are unable to resolve a situation alone, they may be discouraged and either limit the amount of time spent on the technology or abandon it altogether In addition, it is not the mere existence of communication in the social network that is influential, the level of interaction or intensity of communication also plays a significant role (Blonski 1999, Wasserman and Faust 1994) Although communication is central to usage behavior, its role as applied to rate of use is limited because people are less likely to want to communicate when they are doing the same thing over and over again When people attempt different things in connection with the technology, there may be a greater need to communicate or consult with others for assistance Thus

> H_1 Higher intensity of communication with other users about the product leads to higher variety of use

Competition for limited resources Tensions arise because of possible claims to resources that are not available to all members of a social network at all times Daly (2001, p 290) calls this "the presence of negative valence " Salazar (2000) has found that family members negotiate social boundaries in sharing technological space and that electronic and space boundaries are instrumental in determining who uses the computers and when In Lee's (2000) work on WebTV, he found that family members, especially children, compete among themselves to watch WebTV By implication, we argue that limited technological resources have a negative impact on collective use of the technology However, competition for resources implies access to technology, and access is limited by the amount of time a person can spend with the technology People do not necessarily compete for how to use the technology (variety), but for how much time to allocate in using the technology (rate) Thus, competition affects rate of use, not variety of use

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[2] Previous researchers, including von Hippel (1986, 1995) and Hahn and colleagues (1994), have attempted to extend the diffusion framework by proposing similar typologies specific to their research concerns Although both authors' studies are relevant to our current research and provide the right motivation, there are some key differences in terms of both the theoretical basis and the empirical questions Von Hippel's basic interest is identifying lead users in the industrial context and differentiating them from non–lead users Our focus is on consumer households in the context of their use of complex technologies In addition, our fourfold typology of users is based on different criteria Hahn and colleagues focus on a repeat trial model of nondurables (e g , medical products), whereas our focus is on use-diffusion patterns among users (not repeat users) of durables

H_2 Competition for technology in the household results in lower rate of use

Prior experience In addition to interpersonal dynamics, the updating of users' knowledge may be a relevant variable in predicting the direction of UD The complexity of technology suggests that user knowledge plays a critical role in shaping the UD pattern (Alba and Hutchinson 1985, Kiesler et al 1997, 2001, Norman 1999) Technologies change rapidly, thus, users need to update their knowledge to reach a more advanced level of use User knowledge can come from accumulated experience, which provides users with the skills they need to recognize situations in which the technology can be applied and how to apply it Hahn and colleagues (1994) refer to positive effects of "direct product experience" as a key precondition for triers (adopters) to become repeaters Thus, when people gain greater experience with technology, they have developed some efficiencies and perceive themselves as dependent on the technology for their continued use At the same time, people's experience teaches them to become more familiar with the technology and its different possibilities, which positively affects both rate and variety of use Therefore, we hypothesize the following

H_3 Higher accumulated product experience results in higher variety and rate of use

Technological Dimension

The technological dimension consists of two variables (technological sophistication and use of complementary technologies) and refers to the overall technological environment

Technological sophistication Technological sophistication includes the inherent characteristics of the technology, that is, its versatility and capabilities Technology can be sophisticated without being difficult to use For example, compared with automobiles of 25 years ago, automobiles today are more technologically sophisticated, but they are also easier to drive The capabilities of the system define the boundaries of what users can do with it In general, we expect users with access to more-advanced systems to exhibit a greater variety of use At the same time, we believe those users are comfortable with the level of technological sophistication and will want to spend more time with the technology, leading to higher rate of use Thus, we hypothesize the following

H_4 Use of more-advanced technology (i e , technological sophistication) results in higher variety and rate of use

Complementary technologies (household technological density) Use of any technology must take into consideration the use of other technologies in the home, we refer to this as the "technological density of the home" Rogers (1995, p 224) originally proposed this idea, though he refers to it as "technology clusters" According to Rogers, the existence of technology clusters influences the rate of adoption of new innovations Vitalari, Venkatesh, and Gronhaug (1985) proposed and tested a similar idea under the rubric of cognate technologies, which share similar characteristics and can be either competing or complementary In general, competing technologies act as substitutes, and a new technology can displace an existing technology if its performance is superior or more acceptable This idea is similar to the notion of relative advantage, which is commonly cited in the diffusion literature Complementary technologies create synergistic effects, that is, they increase the level of use of all the technologies in the cluster Technology clusters introduce new possibilities for technology use and the ability to exploit the technology in different ways (variety)

H_5 Use of other complementary technologies results in higher variety of use of the specific technology in question

Personal Dimension

Use innovativeness The effect of personal variables on usage behavior is an area that is much investigated in previous research Hirschman (1980) proposes inherent novelty seeking as an antecedent of usage variety, and Price and Ridgeway (1983) develop the use innovativeness scale, which taps into the concept of inherent novelty seeking Price and Ridgeway hypothesize that for consumers to use existing products in multiple novel ways, they must have the ability (creativity) and the incentive (curiosity) to do so Ram and Jung (1990) proceed along the same lines and further suggest that involvement and innovativeness have a positive relationship with usage variety, though the effect of involvement is lower in comparison Consumers' being innovative means being experimental and having an inclination to try different things Thus, innovativeness has a direct link to variety of use On the basis of previous theory and empirical work, we hypothesize the following

H_6 Higher use innovativeness results in higher variety of use

Frustration with technology Complex technology often frustrates users (Mick and Fournier 1998) Similarly, Mukherjee and Hoyer (2000, p 470) observe that the reasons for frustration include "associated learning cost and comprehension difficulty and lack of control" For this same reason, Lupton and Miller (1992, p 11) argue that designers have expended significant time "domesticating and humanizing" home-based technologies An outcome of such arguments is that though a technology may be useful, difficulties in making it perform intended tasks often cause reactions ranging from aggravation to disappointment Frustration arises because the technology fails to perform reliably or to meet the user's expectations As a result, the product is used less frequently (rate of use) and is put to fewer uses than originally intended This leads us to the following hypothesis

H_7 Higher frustration with the technology leads to lower variety and rate of use

An alternative hypothesis about the level of frustration and use of technology can also be put forward As Davis (1989) and Mick and Fournier (1998) point out, consumers may continue to use a product despite frustration and difficulty because the product provides certain utility Thus, if we observe a lack of effect for user frustration, it may be because concerns of utility outweigh levels of frustration

H_8 Level of frustration with technology has no impact on variety or rate of use

External Factors

Factors that are external to the adopting unit may influence usage behaviors A supportive social environment increases use potential If a person speaks to friends and coworkers about products, such communication reinforces user belief systems and, consequently, behaviors Similarly, use of technologies outside of the home (e g , office, school) also influences the use of technology at home by increasing variety, but it may result in a lower rate of variety because some of the usage time at home is taken up by use outside the home In addition, we argue that higher exposure to media may stimulate involvement with the technology, which in turn may account for higher levels of use Therefore, we hypothesize the following

H_9 External communication intensity pertaining to the innovation leads to higher variety of use

H_{10} Access to the innovation outside of the home environment leads to higher variety of use but lower rate of use in the home

H_{11} Exposure to a more target-related media results in higher variety and rate of use

UD Outcomes

Satisfaction with technology and perceived impact of technology It has been suggested that a person's ability to use a product successfully results in higher satisfaction (Anderson and Ortinau 1988, Downing 1999, Kekre, Krishnan, and Srinivasan 1995) It follows that users who exhibit an intense UD pattern are more satisfied with the technology than are users who exhibit limited use Using the expectation confirmation/disconfirmation paradigm, Bolton and Lemon (1999) find that customer satisfaction and service usage are highly correlated Furthermore, the relation is dynamic, that is, customers tend to compare actual usage and normative expectations, and when the comparison is favorable, satisfaction increases Similarly, in product usage, customers may have some normative expectations about product performance When usage behavior approaches intense use, the actual usage is likely to exceed prior expectations and thus lead to higher product satisfaction Over time, satisfaction with the technology may spur more usage (as shown by the dotted line in Figure 1) in a dynamic process

The effects of specialized and nonspecialized use on satisfaction are less clear However, according to Oliver (1980, 1995), consumers' satisfaction with a product is a function of the product's ability to fulfill their expectations As a result, we expect that the adopting unit will exhibit higher satisfaction with specialized use than with nonspecialized use If we take intense use as the highest end of the technology-satisfaction continuum, we can argue that it is followed respectively by specialized, nonspecialized, and limited use The degree of use also directly results in the perceived impact of the technology on daily lives On the one hand, intense use can result in "cultural anchoring," in which the technology becomes so inextricably part of a user's life that it modifies how the consumer operates on a daily basis On the other hand, limited use will not have the same perceived impact, because it is a less integral part of the user's activities Specialized and nonspecialized use result in moderate perceived impact for reasons we stated previously

H_{12} Intense UD is associated with the highest level of (a) satisfaction with the technology, (b) perception of its essentialness in the home, and (c) impact on daily life, followed by specialized, nonspecialized, and limited use

Interest in new (futuristic) technologies Ellen, Bearden, and Sharma (1991) find that the level of satisfaction with an existing technology increases resistance to and reduces the likelihood of adopting an alternative A natural extension of their finding is interest in acquiring related new technologies Users who have successfully integrated the technology into their lives should be least resistant to acquiring similar technologies, because past successful experiences reduce the level of perceived risk involved and heighten the possible benefits that can be realized (Venkatesh, Kruse, and Shih 2003) Rogers (1995) presents a similar argument in his discussion of the adoption of technology clusters In this regard, we expect that the highest interest in future technology acquisition is in the intense use category, followed by the nonspecialized use category In contrast, specialized use may not result in heightened interest in future technology acquisition, because users have invested time and effort in developing expertise in applying the existing technology to repeated use or to a specialized set of tasks

H_{13} Intense UD results in the highest level of interest in acquiring new related technologies, followed by nonspecialized use Specialized use and limited use have the lowest interest in acquiring new related technologies

Research Methodology

A national telephone survey of 910 U S households that owned computers was conducted by means of the random-digit dialing method, a well-established procedure in survey sampling The respondent from each household was selected on the basis of who had the most information about computer use in the household At the time of data collection (1999 and 2000), the U S Census Bureau (1997) estimated that computer penetration in the United States was approximately 60% of the total population, slightly skewed toward higher-income households Therefore, to maximize the probability of representing the computer-owning households, we oversampled higher-income households A comparison of our final sample of computer households with the Census report indicated a close match (see Table 2) Before the full-scale study was launched, the questionnaire for the study was pretested among 25 households for accuracy, validity, and ease of administration

Dependent Variable: Variety of Use and Rate of Use

We determined variety of use with a checklist of possible uses of the computer (Table 3) We based the checklist items on household activities performed by household members with the help of the computer (Robinson and Godbey 1997, Venkatesh 1996) We randomized the list to eliminate any

TABLE 2
Demographics of Survey Sample

	Survey Sample	U S. Census (1997)
Sample Size		
(Number of Households)	910	17,814
Household Income		
$15,000 or less	2 6%	8 1%
15,001–30,000	12 1%	14 8%
30,001–50,000	23 2%	26 3%
50,001–75,000	22 1%	25 4%
75,001 or greater	29 5%	25 4%
Race[a]		
White	88 1%	86 3%
Black	3 6%	5 3%
Hispanic	3 0%	3 9%
Asian	2 2%	3 8%
Other	1 5%	7%
Children in Household		
Yes	44 1%	47 1%
No	55 9%	52 9%

[a]Race taken as the self-reported race of the head of the household

TABLE 3
List of Activities Covered by Computer Use

Activity Space	Activities
Work/employment related	1 Job related 2 E-mail (work-related/ school-related)
Family communication	3 E-mail (personal) 4 Writing letters/ correspondence other than e-mail
Family recreation	5 Games/entertainment
Home management	6 Home management (recipes, family records) 7 Health information 8 Travel information/vacation planning 9 Financial management 10 Online banking
Home shopping	11 Shopping (frequently purchased goods) 12 Shopping (large-ticket items) 13 Shopping (other)
Education/learning	14 School-related
Information center	15 News 16 Sports information 17 Community information

ordering effects In this study, we identified 17 different uses for computers (Table 3), which we grouped into seven major categories that define activity spaces in the home In terms of UD, variety of use shows how computer use diffuses across different household activities For each household, we summed the responses (1 = "yes," 0 = "no") to the 17 items (i e , the uses), the mean uses are 8 28, and the median uses are 8

We measured rate of use as the number of hours of computer use at home by the whole family in a typical week The primary respondent who reported for other household members gathered rate-of-use information on every computer-using member of the household We dichotomized rate of use from the median high and low rate-of-use behavior The median use and the mean use for each household were 14 0 and 20 26 hours per week, respectively To avoid household-size bias, we normalized the measure by number of users in each household, yielding 6 63 hours for the median and 8 81 hours for the mean We divided the normalized rate of use by the median into high and low rate of use

Together, variety of use and rate of use formed the 2 × 2 matrix (see Figure 1) of UD patterns Table 4 gives the percentage of each use pattern in our sample

Determinants

Respondents were asked the frequency of computer-related communication with other users in the home, and we constructed a measure as follows

$$\text{(1)} \qquad \mathrm{HCI}_h = \frac{\sum \kappa_{ij} + \lambda_{ij}}{H_h},$$

where

HCI_h = household communication intensity,
λ_{ij} = frequency of communication between users i and j (2 = "frequently," 1 = "sometimes"),
κ_{ij} = knowledge of the users i and j (2 = "at least one is an expert," 1 = "none are experts"), and
H_h = number of users in the household

This index makes an upward adjustment when communication about computers between two users is more frequent and when at least one of the users is more knowledgeable about computers We made these adjustments because we suspect that more frequent communications, particularly among or with expert users in the home, can contribute more to solving usage difficulties[3] To avoid biases toward larger household sizes, we normalized household communication intensity by the number of computer users in the household

We operationalized competition for computers (USERSPC) as the ratio of the number of computers available at home to the number of users We operationalized experience with computers (YEARSPC) by considering how long (in years) the households had used computers at home We operationalized technological sophistication of computers (PCAGE) as the age of the newest computer in the home We reverse-coded the variable so that a newer computer would have higher value (i e , more sophisticated) than an older computer Although this operationalization ignores variations of different computer configurations, it is still a fair measure of computing capabilities because, in general, computers purchased in a particular year have more memory (RAM) and faster CPU speed than computers purchased in a previous year

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[3] If no communication exists between users i and j, then $\kappa_{ij} + \lambda_{ij}$ is set equal to zero

We operationalized complementary technologies (TECHOWN) as the number of complementary information and media technologies other than computers that were used in the household (for a list of technologies, see the Appendix)

We measured use innovativeness (INNOVATE) by modifying the scale developed by Price and Ridgeway (1983) We selected the items from each of the four factors reported and reworded them to fit the context of the study We randomized the items and measured them on a five-point scale (1 = "not at all," 5 = "very much") of how well the statements describe the respondents themselves (see the Appendix) Reliability analysis indicated that the five items have a Cronbach's alpha of 81, and we took the average of the items as an overall measure of use innovativeness

We measured frustration with technology (FRUST) with a two-item scale in the context of home use ("Computers are difficult to use" and "Often feel frustrated using a computer"), the two items had a Cronbach's alpha of 70

External communication intensity (ECI) measures the extent to which members of the household communicate with friends, coworkers, or a company help desk for assistance with computer usage For each of these, we assigned a score of 2 = "frequently," 1 = "sometimes," and 0 = "never," and we summed the scores to form an index Use of the computer and the Internet outside of the home (OUTACC) is a dummy variable that is equal to 1 if the answer is yes and equal to 0 otherwise We operationalized media exposure of the household (HHMEDIA) as the proportion of users in the household who are exposed to computer-related magazines

Finally, we included three demographic variables in our analysis highest education in the household, household income, and age (oldest user in the household) These variables have been discussed in prior research (Dutton, Kovaric, and Steinfield1985, Venkatesh 1996) We included them as control variables to test whether our main hypotheses would hold in the presence of demographic influences Summaries of independent variables are reported in Table 5

TABLE 4
Use-Diffusion Patterns

UD	Variety of Use	Rate of Use	Percentage of Sample
Intense use	High	High	29 9
Specialized use	Low	High	20 4
Nonspecialized use	High	Low	19 4
Limited use	Low	Low	30 2

TABLE 5
Summary of Determinants

Variable Name	Variable Description	Measure	Mean	Standard Deviation
HCI	Household communication intensity	$(\Sigma\lambda_{ij})$/(number of users)	2 843	1 049
USERSPC	Competition for technology	(Number of personal computers in use)/(number of users)	2 049	1 186
YEARSPC	Experience with technology	Years since adoption	6 953	5 374
PCAGE	Sophistication of technology	Age of newest personal computer (reversed)	12 096	1 768
TECHOWN	Complementary technology ownership	Number of complementary technologies owned	6 263	1 974
INNOVATE	Use innovativeness	Five-item scale, α = 81	3 162	1 053
FRUST	Frustration with use of technology	Two-item scale, α = 70	2 391	961
ECI	External communication intensity	Sum of degree of communication with friends, coworkers, and other sources (e g , help lines, online chat groups) for advice about computer use (2 = "frequently," 1 = "sometimes," and 0 = "never")	3 171	1 394
OUTACC	Access to technology outside of home	Dummy variable 1 = if anyone in household has access, 0 = otherwise	654	476
HHMEDIA	Household media exposure	(Number of users who read computer magazine)/(number of users)	236	344
HHEDU	Highest education level in the home	Years of education for the most educated member of the household (ten-point scale)	6 582	2 038
INCOME	Household income	Household income (six-point scale)	3 882	1 287
AGE	Age of the oldest user in the household	Age of the user	41 770	13 688

Outcome Variables

We determined perceived impact of computers by a randomized ten-item scale (1 = "strongly disagree," 5 = "strongly agree") that was meant to tap into effects of using computers on household activities (see the Appendix) A factor analysis with varimax rotation resulted in two underlying factors that explain 52 38% of the total variance The first factor (eigenvalue = 4 13, Cronbach's $\alpha = 79$) is essentialness of the computer at home, and the second factor (eigenvalue = 1 11, Cronbach's $\alpha = 66$) is the impact of the computer on daily life We averaged the items for each factor We measured satisfaction by using a scale with two items ("experience with computers in general" and "computer's overall performance", 1 = "not at all satisfied," 5 = "very satisfied") We averaged the two items for overall satisfaction (Cronbach's $\alpha = 75$)

We assessed interest in future technologies by asking respondents what their level of interest (1 = "not at all," 4 = "very") was in technologies that were under development (but not in the market at the time of the study) These technologies are sometimes referred to as "smart-home technologies," and we selected them on the basis of ongoing industry research and development of the next wave of technologies for the home

Analyses and Results

We believe that variety and rate of use are simultaneously determined A reason for this is that variety and rate of use can be empirically correlated, such that increases in variety of use often result in increases in rate of use because more time may be needed to perform more uses All else being equal, less variety of use can lead to lower rate of use because users simply have less to do In addition, we believe that variety and rate of use depend on the exogenous variables described in the preceding hypotheses Thus, we specified a two-equation model of variety and rate of use and estimated it with two-stage least squares (2SLS)

Although we do not present a complete model of the consequences of variety and rate of use, we investigated the influences of the four diffusion patterns on perceived impact of technology, satisfaction with technology, and interest in future technologies by using a multinomial logit model (MNL) We used the MNL model because of our interest in analyzing the likelihood of the adopting unit experiencing one of the four different nominal, discrete UD patterns and in identifying the variables that are likely to produce this result In the MNL model, it is customary to use a reference category among the categories that constitute the dependent variable Limited use is a logical choice for a reference category because it represents the lack of unit UD, whereas intense, specialized, and nonspecialized uses capture UD through rate of use, variety of use, or both Consequently, we interpreted the coefficients relative to limited use

To test for the UD outcomes, as reflected in H_{12} and H_{13}, we used a one-way analysis of variance with least significant multiple comparison t-test to test the differences among the four UD categories on the following variables satisfaction with the computer, perceived impact of the computer on home life, and interest in acquiring future technologies

2SLS Regression Analysis

Results for the 2SLS are shown in Table 6 In general, the determinant variables performed better in explaining variety of use ($R^2 = 326$), and seven hypothesized relationships tested significant In addition, we found one demographic variable to be significant For rate of use, we found five hypothesized relationships to be significant ($R^2 = 212$) and none to be significant in the demographic category On the basis of the regression analysis, we were able to find empirical support for H_1–H_6 As for the competing hypotheses, H_7 and H_8, our empirical result is consistent with H_8 but not H_7 H_9–H_{11} were also supported Because our independent variables use different scales, we subsequently present the standardized coefficients for ease of comparison

In terms of relative magnitude of the explanatory variables, the top three variables for variety of use were use innovativeness, sophistication of technology, and complementary technology For rate of use, the top three variables were competition for technology, household media exposure, and sophistication of technology However, without further theoretical justification, at this time we do not attach any significant interpretation to the relative rankings of these determinants

The effect of social dimension on UD received good empirical support Intensity of household communication was positively related to variety of use ($\beta = 166, p < 001$), which confirms that household members, particularly those who have more computer expertise, assist other household members in using technologies for novel consumption situations The observed interaction among users appears to have introduced and reinforced higher usage behavior as well as new usage behavior, thereby broadening the potential applicability of the technology and diffusion in the home

The effect of competition among users for computing resources in the home is negatively related to rate of use, as we hypothesized ($\beta = -224$, $p < 001$) Experience with computers had a significant effect on variety and rate of use, as we hypothesized ($\beta = 165, 098, p < 01$) The two variables within the technological factor significantly affect UD Sophistication of the computer system is positively related to variety of use and rate of use ($\beta = 207, 099, p < 001$), in confirmation of our hypothesis Complementary technology ownership affected variety of use ($\beta = 172, p < 001$)

For the personal dimension, use innovativeness is positively related to variety of use ($\beta = 212, p < 001$), which is in agreement with the results that Ridgeway and Price (1994) and Ram and Jung (1990) report The null effect of frustration with using the computer indicates that adopters are not deterred in their use of the technology despite frustration and difficulties in using it, consistent with H_8

For external dimension, external communication index was positively related to variety of use ($\beta = 123, p < 001$), and using the computer outside the household had no impact on variety of use but was negatively related to rate of use ($\beta = -071$, $p < 05$) This indicates a substitution effect Similarly, media exposure was significant in predicting variety of use and rate of use ($\beta = 132, 107, p < 01$)

As for the sociodemographic variables we tested, the principal effect we found was for highest education in the household, which was positively related to variety of use Although we did not make explicit hypotheses about these variables, but used them only as control variables, the results are not substantial

MNL Analysis

We performed an MNL analysis on the four UD patterns intense, specialized, nonspecialized, and limited use Limited use was the control category Results of the MNL analysis are reported in Table 7 The model –2 log-likelihood is 2008 612 with χ^2 = 404 544 ($p < 001$) Except for frustration, all independent variables were significant in predicting UD patterns

Among the household social dimensionality variables, household communication intensity was significantly related to intense use ($\beta = 201, p < 01$) and nonspecialized use ($\beta = 487, p < 01$) In contrast, competition for computing resources reduces the likelihood of UD, particularly intense and specialized use ($\beta = -242, -462, p < 05$), and this confirms the notion that when people compete for limited resources, the synergy of collective usage is affected Years of experience was significant in predicting intense use ($\beta = 092, p < 001$), specialized use ($\beta = 051, p < 05$), and nonspecialized use ($\beta = 053, p < 05$) This finding suggests that users who interact frequently with other household users tend to develop broader variety of use than do users with limited usage behavior

For technological dimension, the sophistication of the computer increases the probability of intense, specialized, and nonspecialized uses but not limited use It seems essential to update technology before it fails to keep up with usage requirements In contrast, the complementary nature of household technologies is significant in relation to intense use ($\beta = 178, p < 01$) but not other uses It stands to reason that use of related technologies is correlated with variety of uses By the same token, because we did not observe the impact of extended computer use for a single purpose on specialized use, it is reasonable to suggest that it does not translate into a need for related technologies For personal dimension, use innovativeness was significant in predicting intense use ($\beta = 710\ p < 001$) and nonspecialized use ($\beta = 348, p < 01$) The findings and interpretation here are similar to those of the regression analysis and consistent with those of Ridgeway and Price (1984) Although we found none of the coefficients associated with frustration to be significant, all were negative as might be expected

External communication index had a positive effect on intense and nonspecialized use ($\beta = 195,\ 324, p < 05$), and outside access had a negative impact on specialized use ($\beta = -524, p < 05$) In effect, communication with people outside of the household has a similar effect as communication with household users, and access to computers outside of the home reduces some of the time spent on computers at home Media exposure was positively related to intense, specialized, and nonspecialized uses ($\beta = 1\ 704,\ 1\ 098,\ 826, p < 05$)

Finally, the only sociodemographic (control) variables we found to have any impact were the effect of education on specialized use (positive) and the effect of income on nonspecialized use (positive) Absent any theory, it is rather difficult to interpret these two results meaningfully

TABLE 6
2SLS Analysis of Use-Diffusion

	Variety of Use			Rate of Use		
	Coefficients	β	Standard Error	Coefficients	β	Standard Error
α	5 254***	—	1 257	948	—	2 439
HCI	373***	166	067	—	—	—
USERSPC	—	—	—	–1 507***	– 224	232
YEARSPC	113***	165	028	146**	098	060
PCAGE	444***	207	089	457**	099	175
TECHOWN	322***	172	066	—	—	—
INNOVATE	745***	212	143	—	—	—
FRUST	– 158	– 041	114	– 016	– 002	267
ECI	330***	123	088	—	—	—
OUTACC	185	024	256	–1 185*	– 071	590
HHMEDIA	1 428**	132	436	2 490**	107	82
HHEDU	167**	092	056	281	065	166
INCOME	200	070	107	– 419	– 018	237
AGE	008	030	010	045	066	025
VARIETY	—	—	—	927***	244	219
RATE	– 103	– 110	087	—	—	—
R^2	326			212		
Adjusted R^2	317			203		
F	34 860***			23 146***		

*$p < 05$
**$p < 01$
***$p < 001$

UD Outcomes: Multiple Comparison Test

We found significant differences among diffusion categories on all the outcome variables we examined The means of each outcome variables investigated are reported in Table 8 Consistent with the predictions, users who experienced an intense UD pattern rated the computer highest with regard to its essentialness in the home, and users who experienced a limited UD pattern rated it lowest (3 65 versus 2 35, $p <$ 05) The remaining two groups, in the categories of specialized and nonspecialized use, were not significantly different from each other (3 01 versus 2 99, $p >$ 10), but both were significantly lower than intense users and significantly higher than limited users For impact on daily life, all comparisons were significant, intense use was the highest (3 37), followed by specialized, nonspecialized, and limited (2 84 versus 2 65 versus 2 09) Similar patterns of ranking hold for overall satisfaction with the computer at home (4 22 versus 3 95 versus 4 06 versus 3 70, $p <$ 05, except between specialized and nonspecialized use) In general, we found that the more extensive the UD of technology in the home, the more impact it has on daily life, the more it is perceived as essential, and the more satisfied adopters are

We also hypothesized that UD patterns are related to adopters' interest in acquiring new technologies In particular, we expect that adopters who exhibit higher UD are more interested in futuristic technologies than are adopters with a lower level of UD In general, this hypothesis was supported In every case, intense UD pattern ranks the highest with regard to interest in acquiring futuristic technologies,

TABLE 7
MNL Analysis of Use-Diffusion

	Intense	Standard Error	Specialized	Standard Error	Nonspecialized	Standard Error
α	–10 037***	1 207	–3 076**	1 105	–8 089***	1 177
HCI	201**	074	106	216	487*	221
USERSPC	– 242*	113	– 462***	127	093	105
YEARSPC	092***	023	051*	024	053*	024
PCAGE	408***	069	263***	064	219**	064
TECHOWN	178**	060	– 013	061	060	063
INNOVATE	710***	116	204	118	348**	118
FRUST	– 081	113	– 115	112	– 074	117
ECI	195*	080	– 062	082	324***	082
OUTACC	– 160	235	– 524*	230	186	251
HHMEDIA	1 704***	344	1 098**	347	826*	396
HHEDU	109	057	– 123*	057	062	058
INCOME	028	092	006	091	303**	097
AGE	– 077	255	333	009	335	264
–2 LL	2008 612					
Model χ^2	404 544***					
Pearson χ^2	2633 947					
Pseudo-R^2	367					

*$p <$ 05
**$p <$ 01
***$p <$ 001

TABLE 8
Analysis of Outcome of Use-Diffusion

	F	Intense	Specialized	Nonspecialized	Limited
Essentialness	85 35***	3 65^{c}	3 01^{b}	2 99^{b}	2 35^{a}
Impact on daily life	112 51***	3 37^{d}	2 84^{c}	2 65^{b}	2 09^{a}
Satisfaction with personal computer	14 08***	4 22^{c}	3 95^{b}	4 06^{b}	3 70^{a}
Interest in Future Technologies					
Overall	22 59***	2 58^{c}	2 45^{b}	2 12^{a}	2 13^{a}
Shopping	4 69**	1 81^{b}	1 84^{b}	1 58^{a}	1 60^{a}
Home communication	9 38***	2 95^{b}	2 90^{b}	2 42^{a}	2 44^{a}
Home entertainment	15 09***	2 67^{c}	2 47^{b}	2 18^{a}	2 23^{a}
Security/home management	10 52***	2 97^{b}	2 90^{b}	2 49^{a}	2 55^{a}
Home local area network	18 01***	2 49^{c}	2 14^{b}	1 97^{b}	1 81^{a}

$^{a\,b\,c\,d}$Row comparison is significantly different at $p <$ 05
*$p <$ 05
**$p <$ 01
***$p <$ 001

but this interest is weakest in limited UD For specialized UD, interest in these technologies is the second highest in all cases, and nonspecialized use is not significantly different from limited use When viewed as a whole, the data suggest that different UD patterns result in differential levels of interest in future technology acquisition and that UD patterns that are higher on variety of use (intense) exhibit a higher level of interest than the others.

Discussion

We began by stating that the existing AD paradigm has some gaps Prior research in marketing supports our position and provides some extensions to the diffusion framework (Hahn et al 1994, Ram and Jung 1990, Ridgeway and Price 1994, von Hippel 1986) Our main contribution to previous research is the identification of a fourfold typology of users (intense, specialized, nonspecialized, and limited) based on two distinct elements variety of use (high and low) and rate of use (high and low) Between the two elements, variety of use assumes a slightly more central position because it is one of the key elements of use innovativeness (Ridgeway and Price 1994) It also plays a significant role in identifying intense users Many new technologies are capable of performing multiple functions and are therefore candidates for variety of use However, producer-initiated multifunctionality is a necessary condition, but it is the consumer's actual variety of use that matters in the final analysis We find that variety of use is not only an intuitive concept but a theoretically rich construct for application in new product development and design

The results also support our typology, which indicates that intense and limited users are at the two extremes and specialized and nonspecialized users are in the middle on many independent measures (Table 8) These categories are roughly analogous to the adopter categories that have been proposed in the diffusion literature The different users have some distinct characteristics that can be further explored from a marketing standpoint to develop a segmentation strategy and to position new products Although our empirical investigation is focused on personal computers, the conceptual model can easily be adopted to a wide range of innovations that have multiuse potential

Use/User Typology and Market Segmentation

Because product-use patterns determine the formation of segments, the fourfold typology of users we have developed is a constructive way to visualize the market In terms of the proposed segments, intense users seem to dominate other users, given the number of variables we found to be significant (Table 7) This shows that a critical factor in UD is how involved consumers are in the use of the product in terms of both variety of use and rate of use In the UD context, intense users may be considered use innovators par excellence because they score high on both variety and rate

We also propose that the other two key segments worthy of market attention are nonspecialized users and specialized users, because they can be considered potential intense users Limited users may appear less appealing because their product use is not significant, however, they are good candidates for upgrading to a higher level of use if the reasons for their limited use are known in advance

From our study, we were able to show that intense users constitute 30% of the sample, followed by nonspecialized users (20%) and specialized users (19%) Together, these segments constitute approximately 70% of the user population and thus represent a substantial portion of consumers who might be of interest to marketers of key technologies Although we do not claim that our figures constitute a population estimate, given that our sample is a national one, we believe that the values are plausible In terms of Hahn and colleagues' (1994) study, we classify these three segments collectively as "repeaters" in the sense that they have used the product and are ready for repurchase because of their use experience and satisfaction In addition, intense users represent the highest level in terms of use innovativeness In many respects, they can be likened to the lead users that von Hippel (1986) identifies in his work on industrial diffusion

We found that use of related technologies is positively related to higher UD levels and therefore leads to higher satisfaction with the technology itself However, to determine how technology functions can be optimally integrated, we believe the marketer must first understand the nature of use of the technology and its UD path

We also found that adopters with higher UD levels not only are more satisfied with the current innovation but also are more interested in adopting future innovations In general, we did not find major demographic differences between the groups, though income and education seem to have a marginal impact A reason for this may be that whereas income and education may differentiate adopters and nonadopters, they may have less significance in determining actual use patterns

Key Variables and Their Implications

For the independent variables, the results show (Table 6) that the four dimensions of the UD model (household social, technology, personal, and external factors) explain a large measure of the variance Among the three major use categories, intense use is the most highly correlated with the variables in the model, followed by nonspecialized use and somewhat distantly by specialized use (Table 7) A possible conclusion is that nonspecialized users can be considered potential intense users, whereas specialized users are less likely to become intense users because they appear to be set in their ways However, specialized users may be concerned about improvements in existing products that guarantee better performance in their specialized product-use category

In terms of the specific variables, the role of experience is critical in UD because experience leads to cumulative knowledge and learning (Hoch and Deighton 1989) Hoch and Deighton (1989) show that motivated learners exhibit more versatile new product behaviors than do unmotivated learners We believe that intense users and nonspecialized users are more similar to motivated learners and more likely to take advantage of experiential learning

Competition for resources reduces access potential, which in turn negatively affects a person's ability to use the technology Thus, access and use are related The greater the access, the greater are the opportunities for use (Hoffman

Novak, and Venkatesh 1998) If several users need to share the technology, each is limited in his or her use A solution is to increase the number of units in the home, another solution is to schedule technology use in a way that maximizes opportunities for everyone The current examples include television sets, telephones, and automobiles

Our results also show that the social contexts of communication and interactions (internal and external) are central to the UD process, as they are to the AD process Communication among users increases UD, especially with respect to variety of use Our research examines not only the presence or absence of communication but also the intensity of it, including media exposure, which plays an influential role among different sets of users

Because communication with other users can play a significant role in UD, establishing user groups, either virtual or physical, may encourage users to educate and support one another openly in the UD process We also found that, in general, exposure to an external source of information, such as other users, fosters a higher level of UD Additional emphasis should be placed on targeting existing adopters and educating them about potential applications of technology that may not be readily apparent

In terms of technology variables, the presence of complementary technologies increases variety of use, as does ownership of the latest technology, which provides further support to the notion of technology clusters in new product development However, acceptance of new technologies is not automatic, they must be marketed strategically with different appeals to different segments

For the other key variables, use innovativeness emerges as a key factor Our results show that use innovativeness affects variety of use, but not rate of use, in a significant way A question not examined in our study is whether adoption innovativeness and use innovativeness are the same We know from other studies that children display higher levels of use innovativeness than do adults, though children are not mentioned in the context of adoption Although we did not specifically investigate this in our study, we use it to illustrate the point made here

That users are frustrated with technology because of its complexity does not seem to have much bearing, presumably because this problem is neutralized by other factors (e g , perceived benefits of technology) At this point, we speculate on the relationship between two key types of use intense use and nonspecialized use Although both types of use are distinct, they are related, that is, nonspecialized use may eventually lead to intense use because the key aspect of nonspecialized use is to explore various technological possibilities In terms of diffusion outcomes (Table 8), consumers in the intense-use category show greater satisfaction, believe there is a greater impact of technology on family life, and are more likely to regard computers as an essential technology than are other groups

To conclude, when a new product that is capable of fulfilling multiple tasks is introduced into the market, conditions must be created that enable higher variety of use and higher rate of use For example, the goal of marketing communications can be extended beyond traditional promotional strategies that focus on product adoption to include creative uses of the product as well Our research suggests that to encourage such usage behavior, it is important to disseminate use knowledge and to nurture use-based learning In practical terms, marketers of these technological products must be creative in presenting new usage scenarios to the adopters and in fostering direct communications among adopters This suggests that some formal mechanisms should be established for gathering use data on a regular basis

Conclusions and Directions for Further Research

Our study uses a national probability sample of households, and therefore the results can be considered reasonably robust However, the study has some limitations that can be addressed in future studies First, the study is not longitudinal and therefore does not capture the full dynamism of UD Thus, our empirical findings are correlational rather than causal Further research should adopt a longitudinal approach to gain full causal insights Second, our empirical focus is on a single product Studies that involve multiple products would yield some richer insights on how UD varies across different product categories For example, the complexity of a product category with respect to UD can be tested across different segments The impact of different levels of multifunctionality on UD can also be tested We urge researchers to address these issues

Appendix
Details of Items Employed in the Study

Technologies in the Home

- Electronic organizer or handheld computer
- Fax or telex machine
- Pager
- Voice mail or answering machine
- Video-game console
- Digital videodisc, DivX, or laser disc player
- Stereo system or compact disc player
- Satellite television
- Cable television
- Video camera
- VCR
- Digital camera

Use Innovativeness Scale (Adopted from Price and Ridgeway [1983])

- I am creative with computers
- I am very curious about how computers work
- I am comfortable working on computer projects that are different from what I am used to
- I often try to do projects on my computer without exact directions
- I use a computer in more ways than most people do

Perceived Impact of Computer (Two Factors)

1 Factor 1 Essentialness of Computer at Home
    - •The computer is as essential in my home as is any other household appliance
    - •It would be difficult to imagine life without a computer in my home
    - •Households with a computer are run more efficiently than those without a computer
    - •The computer has saved me time at home
    - •The computer has become part of the daily routine in my home

2 Factor 2 Impact of Computer on Daily Life
    - •The computer has changed the way I do things at home
    - •The computer has replaced the telephone as the major communication device in my home
    - •I have more contact with friends as relatives now that I have e-mail
    - •My family watches less television as a result of using the computer or the Internet
    - •The computer has increased the amount of job-related work I do at home

Interest in Future-Oriented Technologies

Cost aside, how interested would you be in having this for your home Would you be "not at all interested," "slightly interested," "somewhat interested," or "very interested" in having this product, or do you already have something like this in your home? (List read in random order)

- •A refrigerator with a computer screen on the door that would allow you to keep track of food inventories and would be linked to the Internet so you could order food and other supplies online
- •An audiovideo system linked to units in each room that would allow you to share home theater events, share VCR programs, and share stereo sound to each room
- •A communication system that combines your telephone, computer, Internet access, and television in one single unit
- •A home computer control system that manages lighting, temperature, home security, and appliances in any and all rooms of your home
- •A local area network for the home that connects multiple computers, printers, and data sources so that you can share information between computers or send information to any printer in your home

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Kenneth H. Wathne & Jan B. Heide

Relationship Governance in a Supply Chain Network

The authors examine how a firm's strategy in a (downstream) customer relationship is contingent on how a related relationship outside of the focal dyad is organized. Drawing on emerging perspectives on interfirm governance and networks, the authors propose that the ability to show flexibility toward a (downstream) customer under uncertain market conditions depends on the governance mechanisms that have been deployed in an (upstream) supplier relationship. The governance mechanisms take the form of (1) supplier qualification programs and (2) incentive structures based on hostages. The authors develop a set of contingency predictions and test them empirically in the context of vertical supply chain networks in the apparel industry. The tests show good support for the hypotheses. The authors discuss the implications of the findings for marketing theory and practice.

Interfirm relationships and relationship governance issues are receiving considerable attention in the marketing literature. A growing body of research addresses different aspects of firms' relationships with exchange partners from a variety of theoretical perspectives (e.g., Bergen, Dutta, and Walker 1992; Cannon and Perreault 1999; Wilson 1995). For example, several studies have relied on the new institutional economics literature, including transaction cost analysis (TCA), to examine how particular governance processes are carried out between firms (e.g., Ghosh and John 1999; Heide 1994; Noordewier, John, and Nevin 1990).

The predominant focus in much of the existing research has been on individual dyadic relationships between firms, such as those between a manufacturer and a customer. However, some scholars have suggested that to understand fully the nature of dyadic interfirm relationships, greater attention must be directed to the larger networks in which the relationships exist (e.g., Anderson, Håkansson, and Johanson 1994; Iacobucci 1996; Levy and Grewal 2000; Moller and Wilson 1995). For example, the industrial networks perspective, as presented by the Industrial Marketing and Purchasing Group (e.g., Håkansson and Snehota 1995; Wilkinson 2001), posits that the implicit assumption of ceteris paribus in other relationships, which underlies much of the extant dyadic research, is an unrealistic one.

In this article, we begin with a particular governance process: adaptation to uncertainty (Williamson 1985). Consistent with TCA, we argue that uncertain conditions in a focal dyadic relationship require the use of governance structures that allow for flexible adaptation to changing circumstances (Williamson 1991). However, we broaden the established TCA model by drawing on extant network perspectives (e.g., Cook and Emerson 1978; Håkansson and Snehota 1995), and we posit that adaptation to uncertainty in a focal dyad depends on how a connected relationship is organized.

We test our conceptual arguments in the context of vertical supply chain networks in the apparel industry. Specifically, our study examines the relationships (1) between a manufacturer and an independent (downstream) customer and (2) between the manufacturer and an independent (upstream) supplier. On the basis of the existing governance literature, we identify two governance mechanisms that a manufacturer can use to structure its relationship with the upstream supplier: supplier qualification and incentive design. Next, we describe the effect of these governance mechanisms on the manufacturer's ability to adapt in a flexible manner to uncertainty in the downstream relationship. The research design used to test our hypotheses about governance effects across levels involves data from matched pairs of manufacturers and retailers in an overall supply chain.

We seek to make the following contributions to the literature. First, from a theoretical standpoint, we want to broaden existing models of interfirm governance. More specifically, we examine whether the normative predictions from TCA about a firm's governance response in a dyadic relationship depend on another one in its immediate network context. As such, we attempt to expand the unit of analysis relative to extant governance research.

Second, from a practical standpoint, firms are increasingly recognizing that relationship management involves more than a single relationship. For example, many manufacturers are recognizing that their downstream customer relationships are constrained by other relationships elsewhere in the larger supply chain (*The Economist* 2001). We respond to the call for research on supply chain issues in marketing (e.g., Stewart 1999) by identifying specific strategies that can be used to manage supply chain relationships

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and by describing their effects across levels in the overall chain.

The remainder of this article is organized as follows. We begin by presenting our conceptual framework and research hypotheses. We then describe the research method used to test the hypotheses and the empirical results. We conclude with a discussion of the implications of our findings, the study's limitations, and possible topics for further research.

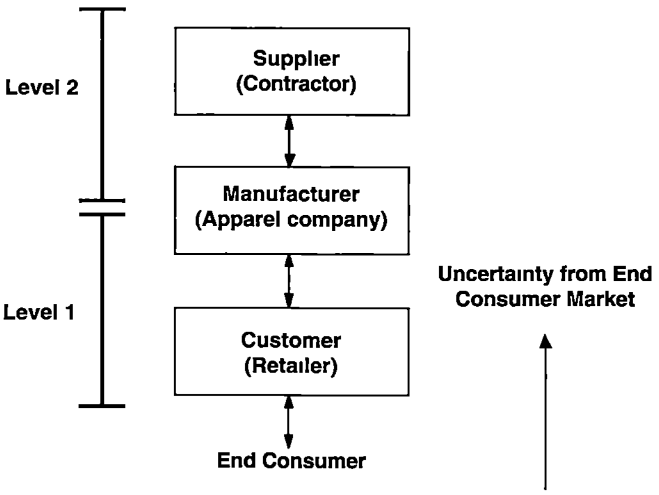
Theoretical Framework

Figure 1 shows a vertical supply chain network that involves relationships at two different levels (1) between a manufacturer and a (downstream) customer and (2) between the manufacturer and an (upstream) supplier. As an example, the manufacturer might be an apparel company (e.g., Jockey), the customer an independent retailer (e.g., Marshall Field's), and the supplier an independent contractor. We begin by considering the dyadic relationship between a manufacturer and a downstream customer.

Level I: Manufacturer–Customer Relationship

In the fashion apparel industry, rapid changes in consumer demand create considerable uncertainty in the downstream market. For example, as a result of continuously changing consumer tastes, retailers face uncertainties in terms of both product design and volume needs (Djelic and Ainamo 1999, Iyer and Bergen 1997). The inherent characteristics of such markets have important implications for the relationships between the firms that serve the end consumers (i.e., retailers) and the firms that supply them (i.e., apparel companies). Specifically, the uncertainties faced by downstream retailers affect the relationship with apparel companies in the form of ongoing needs for flexibility or relationship modification. In the terminology of TCA, because the relevant downstream uncertainties cannot be easily contracted for in advance (i.e., complete contracts that define all the relevant contingencies in the manufacturer–customer relationship cannot be written a priori), they create significant adaptation problems. Transaction cost theorists have suggested that adapting to uncertainty is the "central problem of economic organization" (Williamson 1991, p. 163).

FIGURE 1
Supply Chain Network


Level 2
Level 1
Supplier (Contractor)
Manufacturer (Apparel company)
Customer (Retailer)
End Consumer
Uncertainty from End Consumer Market

Adaptation problems require a specific governance response. In relationships with high levels of uncertainty, TCA suggests that firms will try to craft agreements with good adaptation properties that can economize on ongoing transaction costs (Williamson 1985, 1991). In relationships that require coordinated responses between two independent exchange partners (e.g., an apparel company and a retailer), TCA predicts reliance on so-called relational interfirm contracts (Dwyer, Schurr, and Oh 1987, Gibbons 1999, Noordewier, John, and Nevin 1990, Williamson 1991). Such contracts are based on particular contracting norms (Kaufmann and Stern 1988, Macneil 1980) that enable the parties to overcome planning gaps and adapt in a flexible manner as circumstances change.

However, as Noordewier, John, and Nevin (1990) and other scholars (e.g., Granovetter 1994, Masten 1993) note, TCA is based on a normative decision heuristic that emphasizes a firm's motivation to craft adaptive governance structures. It does not directly address a firm's ability to achieve relational solutions. Drawing on the network literature, we argue that a firm's ability depends in part on how other connected relationships are organized.

Level II: Supplier–Manufacturer Relationship

As we noted previously, scholars have argued for the need to expand the unit of analysis from dyads to business networks (for a historical analysis of network thinking in marketing, see Wilkinson 2001). A noteworthy dimension of the network perspective is that individual relationships are connected (Anderson, Håkansson, and Johanson 1994, Cook and Emerson 1978) in the sense that exchange in one relationship is contingent on or has consequences for exchange in the other relationship (Yamagishi, Gillmore, and Cook 1988).

Consider again the supply chain network in Figure 1. The product that the manufacturer sells to the downstream customer (i.e., the retailer) is obtained from an upstream supplier. For example, many of Jockey's branded garments are not manufactured internally but are sourced from outside contractors subject to company specifications. Thus, when conditions in the downstream market create a need for manufacturer flexibility in relation to the customer, demands are also placed on the upstream relationship. In other words, accommodating the downstream retailer requires modifications in the relationship between Jockey and its upstream contractor.[1]

Consider next the likelihood that a manufacturer's request for (upstream) modifications will be accommodated

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[1] We assume that the manufacturer is motivated to respond to the downstream customer as circumstances change. In addition to the TCA arguments we noted previously, we base our assumption on a manufacturer decision calculus that involves a positive trade-off between the opportunity costs of failing to satisfy the customer (Rindfleisch and Heide 1997) and the direct costs of responding in a particular way. At the end of this section, we discuss how we have tried to explicitly account for (in our empirical test) conditions that affect the manufacturer's decision calculus.

Because the manufacturer and the supplier are separate companies that have individual goals (Iyer and Bergen 1997), it is not definite that the supplier will support the manufacturer's request In addition, opportunism may undermine the manufacturer's downstream strategy in various ways For example, the supplier may have misrepresented its production capacity when the relationship was being established (i e , an *ex ante* adverse selection problem, as per Akerlof's [1970] research) In addition, the supplier may fail to make necessary capacity adjustments *ex post* and opportunistically exploit the manufacturer's request for changes by demanding concessions As Williamson (1991, p 278) notes, "although it is in the collective interest of exchange parties to fill gaps, correct errors, and effect efficient realignments, it is also the case that the distribution of the resulting gains is indeterminate " Research in the transaction cost tradition shows that various forms of opportunistic behavior are common in interfirm relationships, especially during renegotiations of original agreements (John 1984, Masten 1988, Wathne and Heide 2000, Williamson 1985)

As we describe in the next section, the firm's ability to adapt to uncertainty downstream ultimately depends on its having deployed particular governance mechanisms in the (connected) upstream relationship that mitigate the potential problems of incompatible goals and/or opportunism In the absence of appropriate governance efforts upstream, management of the ongoing supplier relationship may be associated with substantial renegotiation costs, which may actually undermine the manufacturer's ability to respond to uncertainty in the downstream market Consider next the specific governance mechanisms that can be used in a relationship with an (upstream) contractor to ensure flexible adaptation downstream [2]

Governance of Supplier Relationship

Extant theory has proposed several strategies or governance mechanisms that can be used to manage relationships with exchange partners In general, the mechanisms fall into two categories (Eisenhardt 1985, Heide 1994) First, a firm can a priori identify or select exchange partners that possess the ability and motivation to support its strategy (Ouchi 1980) For example, an apparel company may require a potential contractor to participate in a formal qualification program Second, a firm can design incentive structures (Williamson 1983) that reward the necessary behaviors and/or penalize noncompliance in the ongoing relationship Our general expectation is that the greater the investment by a firm (e g , an apparel company) in either form of governance in the upstream (contractor) relationship, the greater is its ability to adapt to uncertainty in the downstream (retail) market We discuss each of these governance strategies subsequently

Supplier qualification Firms frequently require potential exchange partners to participate in formal qualification programs (Stump and Heide 1996) In a broad sense, qualification programs are designed to ascertain certain aspects of an exchange partner in a prerelationship phase (e g , Dwyer, Schurr, and Oh 1987) From a theoretical standpoint, the general purpose served by such programs is proactively solving potential governance problems by means of systematic selection

Selection is discussed in different streams of literature, some of which make different assumptions about its specific effects In the organizational theory literature, the conventional rationale for selection is to assess a party's likely "fit" on particular criteria (Chatman 1991, Etzioni 1975) Per our previous example, an apparel company may use a qualification program to evaluate potential contractors in areas such as product quality, manufacturing capability, and financial strength (e g , Gadde and Håkansson 2001, Sarkis and Talluri 2002) Contractors that fail to meet established thresholds on the relevant criteria will be eliminated from further consideration

However, such assessments are limited because they only provide evidence about a contractor's particular skills or abilities Such assessments do not guarantee that the contractor will actually apply the skills to the relationship in question (Kirmani and Rao 2000) To the extent that holding back efforts produces cost savings for the contractor, this scenario is not unlikely

However, organization theory suggests that selection efforts serve an additional purpose, namely, that of a socialization process (Ouchi 1979) More specifically, the qualification program may be specifically designed to expose an exchange partner to a firm's goals and values, and the interaction during the program may promote internalization of the relevant goals (Dwyer, Schurr, and Oh 1987) To the extent that the parties' goals become aligned *ex ante* in this way, the likelihood of subsequent motivation-related problems is greatly reduced (Coleman 1990)

Agency theory (e g , Bergen, Dutta, and Walker 1992) recognizes another possible effect of selection efforts that is due to the opportunities they create for imposing costs on the other party Per our previous example, if the qualification process is costly or time consuming for potential contractors, "appropriate" contractors (i e , ones with the right skills and motivation) can self-select, because only such contractors will get a return on their efforts through repeat sales Similarly, a firm may use selection criteria that directly or indirectly have a cost dimension For example, an apparel company may select on the basis of contractor reputation or observed behavior in other relationships (e g , Ganesan 1994, Kumar, Scheer, and Steenkamp 1995, Rubin 1990) To the extent that a given contractor's reputation is valuable, subsequent behaviors that contradict the established reputation may lead to a monetary loss and therefore are less likely to take place

Consider the specific effects of partner qualification in the context of a particular supply chain network (see Figure 1) Recall from our previous discussion that uncertainty in the downstream market creates the need for relational contracts between the manufacturer and the customer, which ensure flexible adaptation to changing circumstances In transaction cost terms (e g , Williamson 1985), uncertainty requires agreements with good adaptation properties However, when the manufacturer relies on an independent supplier to produce the products, the ability to be flexible (or the actual effect of downstream uncertainty) is contingent on the nature of the manufacturer's upstream relationship

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[2] Our theoretical argument here follows the transaction cost notion that though decision makers are boundedly rational, they are far-sighted in the sense that they have the ability to "look ahead, perceive potential hazards," and factor these into the organization of the supplier relationship (Williamson 1996, p 9) Thus, although manufacturers cannot accurately predict specific conditions in the downstream market (or potential adaptation problems), manufacturers that operate in such markets will make the necessary efforts to structure their upstream relationships appropriately

If the manufacturer has made insufficient efforts to organize the upstream relationship (i e , limited qualification efforts), renegotiation difficulties may prevent the firm from accommodating customers' needs In effect, the relationship with the supplier will serve as a constraint on the firm's actions (Håkansson and Snehota 1995) From the downstream customer's perspective, this implies insufficient flexibility when circumstances require it or a lack of responsiveness on the part of the manufacturer In contrast, if the necessary qualification efforts have been made upstream, the greater is the likelihood of having identified a supplier that is able and motivated to support the manufacturer, the lower are the focal renegotiation costs, and the greater is the likelihood that the need for adaptation in the downstream market can be met

The previous discussion implies that the effect of uncertainty in the downstream market on manufacturer flexibility will be nonmonotonic (Schoonhoven 1981) and that it will shift over the range of the manufacturer's (upstream) supplier qualification efforts More generally, it suggests that the normative TCA prediction for adaptation to uncertainty in the (dyadic) manufacturer–customer relationship is contingent on the governance efforts made in the manufacturer–supplier relationship We summarize our theoretical discussion in the following contingency hypothesis

> H_1 Downstream uncertainty will have (a) a negative effect on the manufacturer's flexibility toward the downstream customer for lower levels of upstream qualification efforts and (b) a positive effect on the manufacturer's flexibility toward the downstream customer for higher levels of upstream qualification efforts

Incentive design Another general governance strategy that is available to a firm is the design of an incentive structure in which the long-term gains from maintaining the relationship exceed the short-term payoffs from potential opportunism (Eisenhardt 1985)

A specific strategy available to a manufacturer is reliance on a "hostage" from the supplier (Williamson 1983) For example, a supplier may provide a performance guarantee in the form of manufacturer-dedicated assets (e g , Mariotti and Cainarca 1986) By dedicating assets, the supplier essentially reduces its ability to replace the particular manufacturer, because the assets can be used only in that particular relationship As Mariotti and Cainarca (1986, p 361) describe, "should this particular supply agreement terminate prematurely, the dedicated assets lose [their] value, as with other types of asset specificity" The effect of the hostage is to lock in the supplier (Heide 1994) and thereby create incentives for behaviors that support the relationship and its continuity Thus, when circumstances in the downstream market require the manufacturer to make requests of the upstream supplier, the presence of a supplier hostage increases the likelihood that the renegotiation requests will be accommodated As such, at least in principle, an upstream supplier hostage has the ability to promote flexible adaptation to uncertainty in the downstream market in a way that is parallel to upstream qualification efforts (see H_1)

As we described previously, the conventional hostage model assumes that the hostage from the supplier actually increases the manufacturer's control However, this is not necessarily the case From the supplier's perspective, hostages can create expropriation hazards, because they allow the manufacturer to extract the supplier's profits For example, when a supplier is locked in, the manufacturer can demand costly reductions in order-cycle time As a consequence, unilateral supplier lock-in may actually reduce, rather than increase, the supplier's willingness to support the manufacturer (Buchanan 1992, Heide 1994)

On the basis of the preceding discussion, we propose that the effect of a supplier hostage, as per the conventional hostage model, is contingent on the extent to which the manufacturer has made a corresponding investment in the relationship If both parties commit, a condition of mutual lock-in is created To the extent that both parties have constrained the alternatives that are open to them or have made each other irreplaceable (Barney and Ouchi 1986, Jackson 1985), the parties' incentives are aligned because opportunism on the part of one firm can be (credibly) retaliated against by the other firm (Provan and Skinner 1989) Ultimately, from the supplier's standpoint, a bilateral exchange of hostages significantly reduces the ongoing expropriation risks in the relationship

Thus, we posit that the ability of an upstream supplier hostage to promote flexible adaptation to changing circumstances downstream depends on both the level of the supplier's hostage and the match with a manufacturer hostage Under mutual and high lock-in, the resulting incentive structure enables the supplier to accommodate the manufacturer's request without the risk of exploitation However, under unilateral supplier lock-in, expropriation concerns on the part of the supplier may undermine flexible adaptation to downstream uncertainty Under such conditions, renegotiation difficulties with the upstream supplier will be a constraint on the downstream relationship, and the manufacturer will come across as unresponsive to the downstream customer

In summary, the discussion in the preceding paragraphs implies that (upstream) supplier hostages have the potential to promote adaptation to (downstream) uncertainty However, the actual nature of the effect depends on the other party's (i e , the manufacturer's) hostages Overall, we predict that the effect of supplier hostages is nonmonotonic over the range of manufacturer hostages

> H_2 Downstream uncertainty will have (a) a negative effect on the manufacturer's flexibility toward the downstream customer when supplier hostages are not accompanied by hostages from the manufacturer (i e , unilateral lock-in, as per the conventional hostage model) and (b) a positive effect on the manufacturer's flexibility toward the downstream customer when supplier hostages are accompanied by hostages from the manufacturer (high mutual lock-in)

Other Effects

As we described previously, the main premise of our theoretical arguments is that flexibility downstream is partly a function of a manufacturer's governance efforts in the upstream supply market Similarly, the downstream customer's own governance efforts with respect to the manufacturer may increase the chances of identifying and keeping an exchange partner that is able and motivated to accommodate the ongoing needs for adaptation As we describe in the "Research Method" section, we control for the customer's own use of both qualification and incentives with respect to the manufacturer

We also recognize that manufacturers themselves may rely on operational strategies that affect their flexibility downstream For example, some apparel companies may use a speculation strategy (Bucklin 1967) to buffer against unpredictable changes in the retail market, specifically, apparel companies can stockpile inventory (e g , Abernathy et al 1999) Some manufacturers may rely on a postponement strategy (Bucklin 1967) For example, some apparel companies may try to delay product differentiation until the last possible moment to compress lead times (and to limit finished goods inventory) and thereby secure flexibility in a more cost-effective way (e g , Abernathy et al 1999, Johnson and Anderson 2000) To control for the possibility that manufacturer flexibility toward the downstream customer is due to such operational strategies, we included them as additional controls in our empirical test

A manufacturer's degree of flexibility may also be affected by the firm's view of the focal customer Recall from our discussion of the upstream manufacturer–supplier relationship that one party's unilateral efforts may be exploited by the other Conceivably, manufacturer flexibility may lead to increasing customer demands, which ultimately serve to extract the manufacturer's profits If there is a risk that the customer will exploit the manufacturer, the manufacturer's motivation to show flexibility in the first place is reduced To control for this, we account for ways the manufacturer can deploy safeguards For example, we control for retailer lock-in with respect to the apparel company In addition, we include a measure of the nature of the product being sold, which may serve as a safeguard against customer exploitation that is quite separate from the incentive structure created in the downstream market Specifically, higher-fashion garments, which represent a critical source of retailer differentiation and for which there are typically fewer alternative sources of supply available (Buchanan 1992), put the apparel company in a position to restrict retail supply In a broad sense, the nature of the product contributes in unique ways to create retailer dependence on the apparel company From the apparel company's standpoint, this ensures that the retailer's request can be accommodated without the risk of subsequent exploitation

Another characteristic of the downstream relationship that may affect a manufacturer's flexibility is the percentage of sales to the focal customer, or the degree of downstream concentration Presumably, in supply chains that have a higher degree of exchange concentration in the downstream market, the stronger is the bargaining position of the focal customer, and the higher is the likelihood that the manufacturer will accommodate the customer's request Finally, a manufacturer's degree of flexibility may be affected by its relative size as compared with that of the upstream supplier and the downstream customer Specifically, larger apparel companies may be able to extract concessions from the upstream contractor (e g , in the form of reduced order-cycle time) and may be less pressured to accommodate the need for flexibility downstream To account for these additional effects, we control for relative size in both relationships

Research Method

Research Context

The empirical context for our study is the U S apparel industry Specifically, our research setting focuses on apparel companies in the Standard Industrial Classification Group 23 (apparel manufacturing) and their relationships with (upstream) contractors and (downstream) retailers Group 23 comprises companies that are primarily engaged in manufacturing cut-and-sew apparel (men's, women's, children's, and infantwear) from woven fabric and purchased knit fabric The contractors and retailers represent suppliers and customers, respectively, in our conceptual framework (Figure 1) The specific unit of analysis for the study is the sourcing arrangement used for a particular garment

We used three main criteria in selecting this empirical context First, all our main independent variables needed to manifest themselves in the setting to various degrees Most important, the context needed to exhibit substantial variation in downstream market uncertainty Second, we required a context in which customer flexibility involved a significant and ongoing effort on the focal manufacturer's part, rather than just maintenance of excess inventory to meet demand fluctuations Third, the manufacturer, the downstream customer, and the upstream supplier needed to be independent (i e , not integrated, no equity cross-holdings)

With respect to our first two criteria, the apparel industry faces several categories of consumer demand, from supplying consumers with utilitarian attire that changes little in style from year to year to providing fashion apparel that is characterized by short product life and fickle consumer preferences (Djelic and Ainamo 1999, Richardson 1996) Fashion apparel poses considerable manufacturing and marketing difficulties Highly unpredictable consumer demand makes it difficult for retailers to select appropriate merchandise and to specify clearly terms of exchange with apparel companies (Mariotti and Cainarca 1986) Furthermore, because timing is a major determinant of consumer value for these products, and because fashion apparel is characterized by short life cycles, apparel companies must continuously adapt their product lines (Buchanan 1992) In this context, relationships between retailers and apparel companies are not easily governed by complete or explicit contracts Although long-term relationships exist between apparel companies and retailers, the relationships must continuously adapt in response to changing circumstances (Djelic and Ainamo 1999)

With respect to our third criterion, apparel companies are increasingly relying on (1) external contractors to manufacture their products and (2) independent retail outlets to sell the products (including discount stores, off-price retailers, specialty stores, department stores, and major chains) (Djelic and Ainamo 1999) [3]

Questionnaire Development

We used mail surveys of apparel companies and their retail customers to measure the relevant theoretical variables To develop the questionnaires, we used the procedures recommended by Churchill (1979) and Gerbing and Anderson (1988) Initially, we conducted in-depth interviews with (1) production managers at four different apparel companies, (2) purchasing managers at two retail companies, and (3) two directors of the American Apparel Manufacturers Association In total, we spent more than 15 hours on personal interviews On the basis of the interviews and a review of previous research on buyer–supplier relationships, we developed preliminary versions of the questionnaires When it was possible, we used existing scale items (e g , Ko and Kincade 1998, Stump and Heide 1996), after we adapted them to our research context Subsequently, the questionnaires were sent to a sample of ten production managers to verify the appropriateness of the terminology used, the clarity of the instructions, and the response formats Six questionnaires were returned, and no particular problems appeared to exist with the scales We also conducted telephone interviews with all of the managers *ex post* to verify the relevance and clarity of the survey questions

Measures

We operationalized the key constructs in our conceptual framework by using multi-item reflective scales (Bollen and Lennox 1991) The Appendix contains a description of response formats and specific items for the multi-item scales

Downstream market uncertainty In our context, the main domains in which downstream uncertainty exists are demand and design characteristics (Djelic and Ainamo 1999, Iyer and Bergen 1997) Specifically, uncertainty exists to the extent that apparel companies are unable to forecast accurately the sales volume and style preferences in the downstream market The actual items are based on the ones developed by Heide and John (1988, 1990) and Ko and Kincade (1998)

Apparel company flexibility We conceptualized flexibility as a global contracting norm In our particular context, flexibility describes the retailer's perception of the apparel company's flexibility in the focal relationship For example, one of the items measures the retailer's perception of the apparel company's flexibility in response to its requests for changes Note that though the primary governance or adaptation problem in this context pertains specifically to volume and design changes for particular garments, the accommodation of such changes requires modifications (i e , flexibility) across a broad range of relationship dimensions (e g , delivery, pricing, terms) Thus, we needed to measure flexibility in global terms Our conceptualization is consistent with that in the existing literature (Heide and John 1992, Noordewier, John, and Nevin 1990)

Unlike many of the other measures that pertain to the apparel company's upstream governance efforts, we obtained the flexibility measure from the retailer Given that our ultimate focus is on flexibility in the downstream customer relationship, the most appropriate source of data on flexibility is the customer in question The customer's perspective need not coincide with an apparel company's self-report For example, our asking the apparel companies to report on their flexibility with respect to a retailer may have introduced a social desirability bias into the study (Mick 1996) Social desirability can manifest itself as a tendency for apparel companies to present themselves as "good" companies In addition, having the same source (i e , the apparel company) report on the independent and the dependent variable may introduce common method biases For example, informants may theorize about underlying relationships (Podsakoff and Organ 1986), which can affect the relationships among the variables in the study (e g , by inflating the correlation between variables and thereby creating a relationship in which no true relationship exists)

We define *contractor qualification* as the scope and extent of selection efforts that are undertaken by the apparel company *ex ante* to verify the contractor's ability (e g , technical expertise, manufacturing capacity) and motivation (e g , general business philosophy, reputation) to perform as needed We asked the apparel company to consider the time when it first established the relationship with the contractor and to indicate the extent of qualification efforts undertaken by the firm We adapted the specific items from the ones used by Heide and John (1990) and Stump and Heide (1996), and we modified them on the basis of the in-depth interviews

Incentive design As we discussed previously, the incentive structure in the upstream relationship is captured by the existence of supplier and manufacturer hostages, which create lock-in or replaceability problems Specifically, we relied on two different scales that measure the degree to which the contractor can replace the apparel company ("contractor hostages") and whether the apparel company faces a corresponding lock-in situation ("apparel company hostages") Both parties committing bilaterally creates a condition of high mutual lock-in, which in turn serves to align the respective parties' interests We adapted our measures from the ones used by Heide and John (1988) and Heide (1994)

Control variables In addition to the focal theoretical variables, we included nine control variables in the model As we discussed previously, the first set of control variables pertains to the retailer's governance efforts with respect to the apparel company We included measures of qualification efforts and incentive design We then included a second set of variables that captures operational strategies that apparel companies can use to meet fluctuations in customer demand

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[3] As we describe in the "Research Method" section, we purposely eliminated from the study firms that relied on vertical integration as a governance approach because of the different way adaptation problems are managed under ownership Rindfleisch and Heide (1997) point to the mixed pattern of results for uncertainty in previous research, which may partly be due to differences in terms of the governance approaches used

These strategies are inventory maintenance and delayed product differentiation The third set of control variables pertains to the apparel company's safeguards with respect to the retailer In addition to controlling for the retailer's investments with respect to the apparel company, we included a categorical measure of garment characteristics (budget/mass, moderate, better, bridge, and designer) In our model, the garment characteristic variable is represented by four dummy variables (with budget/mass as the reference category) Finally, we also included measures of relative firm size (upstream and downstream) and percentage of sales to the focal customer (i e , retailer concentration)

Data Collection

Our research design involves a multilevel effort, because data are collected from two parties in the supply chain network (Figure 1) We obtained measures of the key independent variables (i e , downstream market uncertainty, contractor qualification, and incentive design) from the apparel companies We obtained the key dependent variable, apparel company flexibility in the downstream market, from purchasing managers and buyers in retail companies

Apparel companies Our sample was a national mailing list, purchased from List Source USA, that contained names of managers at 9574 independent U S apparel companies All managers were contacted personally by telephone to screen their firm for eligibility and to locate a key informant in the production, planning, and control department Campbell's (1955) criteria of informants being knowledgeable about the phenomena under study and able and willing to communicate with the researcher constituted the criteria for selection In many cases, our presurvey screening process required multiple telephone calls or successive "snowballing" to locate an appropriate key informant

On the basis of the telephone contacts, we identified 1764 managers who (1) were knowledgeable about the phenomena under study, (2) worked in companies we judged appropriate for the study, and (3) agreed to complete the questionnaire The remaining firms could not be reached (36%), were not eligible for the study (38%) on the basis of the established criteria (i e , use of independent contractors and sales to independent retailers), or refused to participate (8%)

Each of the 1764 managers received a mail questionnaire and was asked to complete it with respect to one particular contractor and retailer about which he or she was knowledgeable The managers were asked to select and describe a particular sourcing arrangement in which the contractor was the largest source for a particular apparel item (in terms of annual dollar value) If the item was sold to more than one retailer, the managers were asked to select the largest retailer of the item (in terms of annual purchase volume)

As an additional step toward increasing the quality of the informant reports, each questionnaire included *post hoc* checks on the informant's knowledge about his or her firm's dealings with the contractor and retailer, respectively (seven-point scale) The questionnaire packet contained a cover letter, a prepaid envelope, and the questionnaire To motivate informants to respond, they were offered an incentive in the form of a report that summarized the results of the study

Three follow-up telephone calls were made to nonrespondents, and a second mailing was sent to informants who had lost or not received the first survey Of the 1764 mailed questionnaires, 497 were returned, for an overall response rate of 28% Although the response rate is somewhat modest, it is consistent with other distribution channel (e g , Mishra, Heide, and Cort 1998) and alliance (e g , Rindfleisch and Moorman 2001) studies that have relied on the same data collection strategy Of the 497 questionnaires received, we discarded 13 because of an excessive amount of missing information In addition, on the basis of the *post hoc* test of informant quality, we eliminated 63 companies, which had scores lower than four on either of the two knowledge scales The average knowledge scores for the informants were 6 3 (standard deviation [s d] = 89) and 6 2 (s d = 99), respectively, which indicates that the selected informants were highly qualified to report on their firm's relationships with contractors and retailers The final sample of apparel companies consisted of 421 firms, for a usable response rate of 24%

To assess whether nonresponse bias was an issue, we compared data from early and late survey respondents, following the procedure that Armstrong and Overton (1977) suggest Specifically, we tested the null hypothesis of no mean difference across the two groups (using t-tests) with respect to the key independent variables in the conceptual framework (i e , downstream uncertainty, contractor qualification, and incentive design) In our final sample, approximately 32% of the questionnaires were received before two weeks and 68% were received after two weeks We found no significant differences between the two groups on any of the variables, which suggests that nonresponse bias is not a problem

In addition to comparing early and late respondents, we were also able to compare our final sample of firms with the larger sample of U S apparel companies with respect to the number of employees Again, our hypothesis of no mean difference was supported, providing additional evidence that nonresponse bias may not be a problem

Retailers We used a similar procedure to that described previously to identify an informant within the retailer's firm The informant from the apparel company was asked to identify a person in the customer firm who was knowledgeable about his or her firm's relationship with the apparel company In total, 218 names were obtained and subsequently contacted by telephone Of the 218 retailers that were contacted, 178 (82%) agreed to participate and were mailed a questionnaire In total, 81 questionnaires were returned, for a response rate of 46% We did not eliminate any cases on the basis of the *post hoc* test of informant quality The final score on the knowledge scale was 6 5 (s d = 74)

In our final sample, 36% of the retailer questionnaires were received before two weeks and 64% were received after two weeks To evaluate nonresponse bias, we compared the two groups on the basis of the key control variables collected from the retailers (i e , qualification efforts by the retailer and incentive design in the downstream relationship, respectively) We found no significant differences between the two groups on any of the variables, which suggests that nonresponse bias is not a problem

Our last assessment of nonresponse bias involved comparing the sample of 421 apparel companies from the first phase of data collection with the subsample of 81 apparel companies that we used to test our hypotheses We again tested the null hypothesis of no mean difference across the two groups with respect to the key independent variables in the conceptual framework, and we found no significant differences Together, the tests suggest that nonresponse bias is not a problem

Measure Validation Procedure

To identify items that did not belong to the specific construct domain, we initially subjected each set of items used for our multi-item scales to an examination of item-to-total correlations We examined the items that were deleted from the initial set and compared them with the original conceptual definitions of the constructs In each case, we concluded that deleting the item did not significantly change the domain of the construct, as it was initially conceptualized To verify unidimensionality, we subsequently subjected the resulting pool of items to confirmatory factor analysis with LISREL 8 3 (Joreskog and Sorbom 1995)

In total, we used a pool of 47 items to measure the eight constructs Because we could not include all the items in a single-factor model without violating the ratio of sample size to number of parameters (Joreskog and Sorbom 1995), we divided the set of scales into two subgroups consisting of (1) the focal theoretical variables (i e , apparel company flexibility, downstream market uncertainty, contractor qualification, contractor hostages, and apparel company [upstream] hostages) and (2) the control variables (i e , qualification by retailer, retailer hostages, and apparel company [downstream] hostages), respectively (Bagozzi and Edwards 1998) We then employed a partial disaggregation model for each subgroup of scales to increase further the ratio of sample size to number of parameters (Bagozzi and Heatherton 1994, Marsh and Hocevar 1985)

To evaluate each factor model, we used a combination of absolute fit indexes (χ^2 and root mean square error of approximation [RMSEA]) and incremental fit indexes (incremental fit index [IFI] and comparative fit index [CFI]) All indexes met or exceeded the critical values (Model 1 $\chi^2 = 107\ 53$, $p =\ 16$, RMSEA = 04, IFI = 97, and CFI = 97, Model 2 $\chi^2 = 28\ 45$, $p =\ 24$, RMSEA = 05, IFI = 99, and CFI = 99) for good model fit (Bentler 1990, Bollen 1989, Browne and Cudeck 1992)

We then assessed the reliability of the scales We calculated coefficient alpha (Cronbach 1951) for the completely disaggregated scales and composite reliability for the partially disaggregated scales (Fornell and Larcker 1981) We also examined the parameter estimates and their associated t-values and assessed the average variance extracted for each construct (Fornell and Larcker 1981, Gerbing and Anderson 1988)

As is shown in Tables 1 and 2, the coefficient alpha levels all exceed the 7 level that Nunnally (1978) recommends Moreover, all the factor loadings for the partially disaggregated multi-item scales are significant, and the composite

TABLE 1
Parameters for Partially Disaggregated Measurement Model: Focal Theoretical Variables[a]

Items	Apparel Company Flexibility	Contractor Qualification	Contractor Hostages	Apparel Company (Upstream) Hostages	Downstream Market Uncertainty
X1	87 (9 56)	—	—	—	—
X2	83 (8 83)	—	—	—	—
X3	94 (10 84)	—	—	—	—
X4	—	85 (9 26)	—	—	—
X5	—	81 (8 61)	—	—	—
X6	—	70 (6 92)	—	—	—
X7	—	92 (10 41)	—	—	—
X8	—	—	93 (10 02)	—	—
X9	—	—	82 (8 47)	—	—
X10	—	—	72 (7 10)	—	—
X11	—	—	—	83 (7 40)	—
X12	—	—	—	76 (6 76)	—
X13	—	—	—	64 (5 67)	—
X14	—	—	—	—	85 (8 93)
X15	—	—	—	—	81 (8 36)
X16	—	—	—	—	87 (9 19)
Coefficient alpha[b]	93	88	84	74	86
Composite reliability	91	89	87	80	88
Variance extracted	78%	68%	69%	56%	71%
Highest shared variance	12%	14%	14%	3%	12%

[a] Item loadings, t-values, coefficient alpha, composite reliability, variance extracted, and highest shared variance
[b] Completely disaggregated scales

TABLE 2
Parameters for Partially Disaggregated Measurement Model: Control Variables[a]

Items	Qualification by Retailer	Retailer Hostages	Apparel Company (Downstream) Hostages
X1	83 (8 84)	—	—
X2	93 (10 46)	—	—
X3	88 (9 66)	—	—
X4	—	82 (8 29)	—
X5	—	81 (8 14)	—
X6	—	85 (8 67)	—
X7	—	—	87 (9 35)
X8	—	—	86 (9 29)
X9	—	—	85 (9 15)
Coefficient alpha[b]	90	83	89
Composite reliability	91	86	90
Variance extracted	77%	68%	74%
Highest shared variance	3%	5%	5%

[a]Item loadings, t-values, coefficient alpha, composite reliability, variance extracted, and highest shared variance
[b]Completely disaggregated scales

reliabilities range from 80 to 91, indicating acceptable levels of reliability for the scales (Fornell and Larcker 1981) The average variances extracted range between 56% and 78%, and all are greater than the recommended 50 level (Fornell and Larcker 1981)

Finally, we investigated discriminant validity by calculating the shared variance between all possible pairs of constructs and demonstrated that they were lower than the average variance extracted for the individual constructs As is shown in Tables 1 and 2, all possible pairs of constructs passed Fornell and Larcker's (1981) test, which is evidence of discriminant validity among the measures To assess discriminant validity further, we assessed pairs of scales in a series of two-factor confirmatory models, in line with the suggestions of Bagozzi and Phillips (1982) Following the procedure Joreskog (1971) describes, we respecified the two-factor models by restricting the factor intercorrelations to unity, and then we performed χ^2 difference tests (with one degree of freedom) on the values we obtained for the constrained and unconstrained models In all cases, the χ^2 was significantly higher in the constrained models, thereby indicating discriminant validity between the constructs The results, in combination with the fit indexes for each factor model, suggest that the measurement scales are reliable and valid Table 3 shows the correlations between our study variables As we expected, some of the correlations between the interaction variables and their components are high However, as Buvik and John (2000) note, significant results for higher-order interaction terms in a regression model in the presence of lower-order terms mean that the imprecision (reduced power) due to multicollinearity is not a valid threat

Hypotheses Tests

Our research hypotheses specify that the effect of downstream uncertainty on apparel company flexibility will shift across the range of upstream qualification and incentive structure To test the hypotheses, we estimated an ordinary least squares regression model and treated the upstream governance mechanisms as moderators (Sharma, Durand, and Gur-Arie [1981] refer to these as "specification variables") of the relationship between uncertainty (the predictor variable) and flexibility (the criterion variable)[4] We specified the model as follows

$$
\begin{aligned}
(1)\quad \text{Apparel company flexibility} = {} & \alpha_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 \\
& + \beta_4X_4 + \beta_5X_3X_1 + \beta_6X_4X_1 \\
& + \beta_7X_3X_4 + \beta_8X_1X_2 \\
& + \beta_9X_3X_1X_4 \\
& + \text{control variables} + \varepsilon_1,
\end{aligned}
$$

where

X_1 = downstream market uncertainty,
X_2 = contractor qualification,
X_3 = contractor hostages, and
X_4 = apparel company (upstream) hostages

Table 4 shows the estimated coefficients and associated t-statistics[5] First, the model explains a sufficient amount of variance to justify examination of the individual coefficients (adjusted R^2 = 33) Second, the prediction for H_1 is captured by the combination of the effect of downstream market uncertainty (β_1) and the interaction between contractor qualification and uncertainty (β_8) on downstream flexibility

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[4] We considered two additional approaches to estimating interaction effects indicant product and subgroup analysis Given some of the possible limitations of these approaches, such as dichotomizing a continuous variable (see, e g , Jaccard and Wan 1996), we chose to test the hypotheses by using product-term regression analysis

[5] To mitigate the potential threat of multicollinearity among the interaction terms and the other variables in the regression model, we mean-centered all independent variables (Aiken and West 1991) When the focal independent and moderator variables are mean-centered, the regression coefficient for the independent variable reflects its influence on the dependent variable at the average value of the moderator variable (Jaccard and Wan 1996) The interpretations of the interaction effects remain the same

TABLE 3
Correlation Matrix

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1 ACF	1 0																			
2 CQ	06	1 0																		
3 CH	-05	-30	1 0																	
4 ACUH	02	-07	16	1 0																
5 MU	-24	-04	-14	06	1 0															
6 CQ × MU	06	-01	-11	03	14	1 0														
7 CH × MU	-17	-11	-05	-26	-26	-30	1 0													
8 ACUH × MU	-09	03	-24	00	-18	26	07	1 0												
9 CH × ACUH	-06	-13	10	-48	-24	-06	16	06	1 0											
10 CH × MU × ACUH	20	-05	14	05	06	-26	-16	-73	-03	1 0										
11 RQ	27	-02	-16	-00	-02	-00	11	-12	-22	11	1 0									
12 RH	07	-11	13	03	-02	-12	14	01	-08	-06	-03	1 0								
13 ACDH	-10	-18	16	-02	07	00	09	-02	01	08	22	-20	1 0							
14 RH × ACDH	-16	05	-18	02	-02	-10	13	05	-06	-16	-08	13	-13	1 0						
15 Size apparel company > contractor	-01	-10	31	-22	08	05	09	-11	19	-02	-02	-15	22	-11	1 0					
16 Size apparel company > retailer	-23	-08	-14	-16	02	23	-10	15	07	-21	-22	-12	-33	-01	-12	1 0				
17 Postponement	06	04	02	-17	-20	-13	-07	03	-03	-10	07	-00	07	-05	-11	-10	1 0			
18 Inventory	15	12	-16	02	-02	05	-04	20	-15	-16	05	15	-11	08	-03	-05	21	1 0		
19 Garment	32	-02	-13	-02	-15	06	-01	03	-00	-02	-15	-27	-25	07	-13	-16	-24	08	1 0	
20 Retailer concentration	17	-06	03	-01	-05	12	-06	05	-09	-17	-24	-01	-23	01	-20	-13	-12	24	-13	1 0
Mean	5 35	4 79	3 59	3 61	3 65	-05	24	10	37	-70	4 80	3 36	3 62	60	38	-36	3 35	4 25	3 4	27 4
S D	1 1	1 1	1 6	1 5	1 1	1 3	1 9	1 9	2 7	4 0	1 4	1 7	1 8	3 1	8	8	1 9	1 8	1 1	24 9

Notes R > 22 are significant at $p <$ 05 (two tailed) for n = 81 Acronyms are defined as in the Appendix

TABLE 4
Ordinary Least Squares Regression Model

Independent Variables	Unstandardized Coefficients	Standardized Coefficients	t-Value
MU	– 35	– 34	–3 21***
CQ	03	03	29
CQ × MU	20	23	2 07***
CH	03	05	38
ACUH	– 02	– 03	– 21
CH × MU	– 12	– 20	–1 78**
ACUH × MU	06	10	70
CH × ACUH	01	03	26
CH × MU × ACUH	09	32	2 06***
Retailer Governance Efforts			
RQ	22	26	2 49***
RH	04	06	59
ACDH	– 15	– 23	–2 06***
RH × ACDH	– 02	– 07	– 65
Other Controls			
Apparel company inventory (speculation)	01	01	12
Delayed product differentiation (postponement)	11	19	1 63*
Garment characteristic, dummy 1 (designer)	1 52	41	2 84***
Garment characteristic, dummy 2 (bridge/difference)	2 22	43	3 54***
Garment characteristic, dummy 3 (better)	91	37	2 16***
Garment characteristic, dummy 4 (moderate)	77	34	2 01***
Size apparel company > contractor	09	06	56
Size apparel company > retailer	– 39	– 29	–2 62***
Retailer concentration	01	18	1 60*
Adjusted R^2	33		

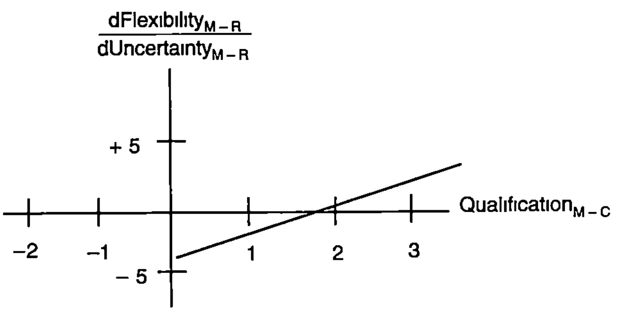
*$p <$ 1 (one-tailed test)
**$p <$ 05 (one-tailed test)
***$p <$ 025 (one-tailed test)
Notes Dependent variable is apparel company's flexibility toward retailer (n = 81) Acronyms are defined as in the Appendix

As we predicted, the effect of uncertainty on flexibility is significant and negative (t = –3 21, $p <$ 025), and the effect of the interaction between contractor qualification and uncertainty is significant and positive (t = 2 07, $p <$ 025) Together, the effects provide support for H_1

Our contingency prediction (i e , the effect of downstream uncertainty on apparel company flexibility will shift in a nonmonotonic way over the range of contractor qualification) can be examined more formally by graphing the partial derivative of the regression equation (Equation 1) following the procedure that Schoonhoven (1981) suggests As is evident in Figure 2, downstream market uncertainty has a negative effect on apparel company flexibility for lower levels of contractor qualification and a positive effect for higher levels of contractor qualification This indicates that upstream qualification efforts increase the apparel company's ability to accommodate the ongoing need for flexibility under uncertain market conditions

FIGURE 2
Impact of Contractor Qualification on the Relationship Between Downstream Market Uncertainty and Apparel Company Flexibility

$$\frac{dFlexibility_{M-R}}{dUncertainty_{M-R}} = -35 + 20\,(Qualification_{M-C})$$



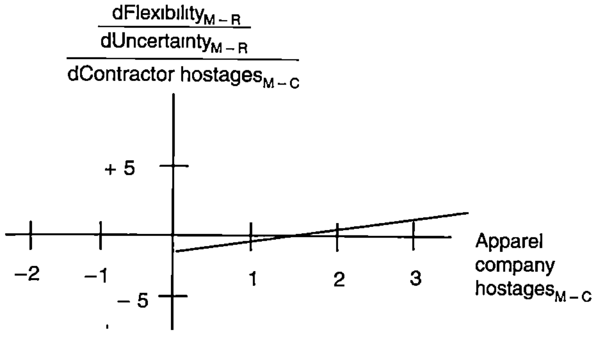
The prediction for H_2 is captured by the combination of (1) the two-way interaction between downstream market uncertainty and contractor hostages (β_5) and (2) the three-way interaction among uncertainty, contractor hostages, and apparel company hostages (β_9) on flexibility As is evident in Table 4, the two-way interaction between uncertainty and contractor hostages is significant and negative (t = –1 78, $p <$ 05), which is consistent with our theoretical argument about unilateral hostages The three-way interaction captures our expectation that the ability to secure flexibility downstream by means of upstream hostages requires that a hostage exchange takes place As we predicted, the interaction is significant and positive (t = 2.06, $p < .025$), which, together with the negative two-way interaction, provides support for H_2.

Figure 3 shows the contingency prediction that underlies H_2 more formally through partial derivatives, which is similar to our previous analysis. However, because H_2 involves a higher-order interaction, the graph in Figure 3 is based on the partial derivative of the former equation (Figure 2) (i.e., the second derivative of the original regression equation [Equation 1], per Fisher's [1988] procedure). Specifically, Figure 3 shows how apparel company hostages enable contractor hostages to promote flexible adaptation to uncertainty. As is evident in Figure 3, when contractor hostages are not accompanied by hostages from the apparel company (i.e., a condition of unilateral supplier lock-in), downstream market uncertainty has a negative effect on apparel company flexibility. However, the effect turns positive for higher levels of apparel company hostages (i.e., a shift toward mutual lock-in). This suggests that the effect of hostages as governance devices depends on both the level at which a focal hostage is deployed and the match with the other party's hostage.

For the control variables, as we expected, qualification by the retailer has a positive and significant effect on apparel company flexibility (t = 2.49, $p < .025$), and apparel company (downstream) hostages have a significant and negative effect on apparel company flexibility (t = –2.06, $p < .025$). Retailer hostages do not have a significant effect on apparel company flexibility. With respect to the impact of inventory (speculation) and delayed product differentiation (postponement), we found a positive and significant effect of postponement (t = 1.63, $p < .1$), whereas apparel company inventory had no significant effect on the dependent variable. As we expected, higher-fashion garments (relative to the baseline category), measured through the dummy variables, give rise to apparel company flexibility in the downstream market (all t-values > 1.98, $p < .025$). Finally, both size (measured in the downstream market) and retailer concentration have significant effects on apparel company flexibility (size: t = –2.62, $p < .05$; retailer concentration: t = 1.60, $p < .1$) in the expected directions.[6]

FIGURE 3
Impact of Apparel Company Hostages on the Ability of Contractor Hostages to Promote Flexibility Under Downstream Market Uncertainty

$$\frac{\dfrac{d\text{Flexibility}_{M-R}}{d\text{Uncertainty}_{M-R}}}{d\text{Contractor hostages}_{M-C}} = -.12 + .09\,(\text{apparel company hostages}_{M-C})$$



Discussion

The predominant focus in previous research on interfirm relationships has been on individual dyadic relationships. Recently, scholars have suggested that to understand fully the nature of dyadic relationships, greater attention must be directed to the network context in which they exist. In this study, we drew on emerging perspectives on interfirm governance and networks to develop a theoretical framework of connections between relationships at different levels in a vertical supply chain network. Our starting point was a particular governance process, namely, adaptation to uncertainty (Williamson 1985). Using established TCA logic, we argued that uncertain market conditions require that relational elements (i.e., flexibility) be built into a focal relationship to facilitate adaptation to changing circumstances (Macneil 1980; Williamson 1991). However, drawing on the network literature, we augmented the basic TCA model by positing that the actual ability to build flexibility into a dyadic relationship may depend on how other connected relationships in the firm's larger supply chain are governed.

We tested our conceptual arguments in supply chain networks that consisted of relationships (1) between a manufacturer and an independent (downstream) customer and (2) between the manufacturer and an independent (upstream) supplier. We identified two specific governance strategies for the upstream supply market: supplier qualification and incentive design. We then described the effect of the governance strategies on a manufacturer's ability to adapt to uncertainty in a flexible manner in the downstream market.

Overall, the empirical results show good support for our theoretical arguments that individual relationships in a larger network are connected and the ability to adapt to uncertainty in one relationship depends in part on a firm having deployed particular governance mechanisms (qualification and hostages) in another However, we note that the process by which hostages promote adaptation is considerably more complex than the one for qualification In general, incentives and selection seem to work in different ways Governance deployment is a complex matter, and additional research into the properties and effects of alternative mechanisms is a priority We return to this issue in the "Limitations and Further Research" section

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[6] As is consistent with our theoretical arguments, we found support for a model in which the effect of downstream uncertainty on apparel company flexibility was contingent on the firm's upstream governance efforts. However, it may be useful also to consider a competing model in which uncertainty is a direct antecedent of upstream governance mechanisms (i.e., the governance mechanisms are mediators, rather than moderators, of the relationship between uncertainty and flexibility). We examined this possibility by estimating two path models; the governance mechanisms served as complete and partial mediators, respectively. Neither model showed acceptable levels of fit. Although we hesitate to emphasize individual parameters in light of poor overall model fit, we note that none of the mediating paths were significant. Overall, this suggests that governance decisions at one level in a supply chain network are not directly driven by market conditions at another level and do not in themselves affect flexibility across relationships. Moreover, the results indicate that both governance mechanisms conform to the psychometric definition of a pure moderator variable (Sharma, Durand, and Gur-Arie 1981).

In general, this study emphasizes the importance of broadening the unit of analysis, both in transaction cost theory and in relationship research We note, however, that proponents of TCA have actually acknowledged this themselves For example, Williamson (1985, p 393) suggests that because TCA normally examines each trading nexus separately, "interdependencies among a series of related contracts may be missed or underevaluated as a consequence " However, to date, this idea has received little attention in the governance literature An exception is Antia and Frazier (2001), who document how contract enforcement in a particular dyad is influenced by factors outside of the dyad itself Another exception is Heide and John (1988), who describe how agents' bonding efforts in one (customer) relationship serve to discourage opportunism in another (i e , by a principal) Finally, Mishra, Heide, and Cort (1998) show how the strategies used to manage relationships with end customers influence how a firm manages its employee relationships

Our current research builds on these studies By drawing on extant network perspectives, our study highlights the important implication of accounting for "related contracts," namely, their effect on the ability to respond in a given relationship in accordance with TCA's prescriptions

Managerial Implications

Supply chain management has emerged in recent years as a key source of competitive advantage As companies continue to outsource business activities, they are realizing that practicing relationship management involves more than managing an individual relationship (Byrnes 2001, *The Economist* 2002) For example, many manufacturers are recognizing that their downstream customer relationships are often constrained by other relationships in the larger supply chain (*The Economist* 2001) Our study has two key implications for managers First, we identify specific strategies that can be used to manage supply chain relationships Second, we describe the effects of these strategies across levels in an overall chain

Consider a manufacturer's ability to meet a downstream customer's (e g , a retailer's) continuously changing needs Although a manufacturer cannot accurately predict future conditions in the downstream market (and the specific needs for adaptation), it nevertheless can make proactive efforts to structure the supply chain Specifically, the manufacturer needs to consider possible constraints throughout the supply chain that may affect its ability to meet customers' needs The constraints include possible governance problems due to incompatible goals and/or opportunism in the upstream supply market On the basis of an assessment of the potential problems, the manufacturer can deploy particular governance mechanisms in the relationship In this study, we show how supplier qualification programs and incentive structures increase a manufacturer's ability to adapt in a flexible manner to uncertainty in the downstream customer relationship

Although flexibility is one of the most commonly noted dimensions of strong customer relationships (e g , Achrol and Kotler 1999), it is not a goal in itself Because promoting flexibility requires investments on a firm's part (e g , qualification programs involve substantial costs), a firm should make such efforts selectively However, whenever a manufacturer seeks downstream flexibility, promoting support throughout a supply chain becomes an important part of a firm's overall strategy

Limitations and Further Research

The results of our study must be interpreted in view of certain limitations For theory-testing purposes, we decided to test our hypotheses in a particular (and homogeneous) context the U S apparel industry Restricting our sample in this way served the dual purposes of controlling for extraneous sources of variation and developing grounded measures At the same time, caution should be used in extrapolating our results to other contexts

Furthermore, as is evident from our previous discussion, in our hypotheses testing, we faced certain challenges that pertained to our (1) using matched apparel company–retailer pairs (because of the need to obtain the dependent and independent variables from different parties), (2) controlling for many variables, and (3) testing a three-way interaction A joint effect of the three challenges was that we needed to estimate a relatively complex model with a somewhat modest sample size, which may raise concerns about the robustness of our results To increase confidence in our findings, we undertook a validation task based on a regression procedure that Anderson and Weitz (1989) previously used The procedure involved estimating a model that included all the focal variables used to test the two research hypotheses and then regressing the residuals from the first model against all the control variables (including the remaining second-order terms) Finally, we included the significant variables in the second model in a reestimation of the first model The results from this model, which has a more modest set of parameters (and raises fewer concerns about potential overfitting), were almost identical to the model in Table 4 and suggest that our results are not sensitive to model specification

We also limited our study to two specific governance aspects of the manufacturer–supplier relationship qualification and incentive design A natural extension of our study would be to consider whether other governance mechanisms that may facilitate downstream adaptation exist For example, a key construct in the general literature on governance is monitoring Unfortunately, as Wathne and Heide (2000) note, the role of monitoring in interfirm relationships has not always been stated clearly More specifically, it is not entirely clear whether monitoring (as a governance strategy) matches up with specific governance problems (e g , adaptation to uncertainty) Thus, a significant topic for further research is to specify in greater detail the range of governance mechanisms that can be used to manage supply chain relationships and the properties of each mechanism with respect to specific governance problems

Further research could also be usefully directed toward exploring particular supply chain initiatives, such as quick response and efficient consumer response Unfortunately, because these are umbrella terms, there is little consensus about their meaning For example, in recent literature (e g , Coughlan et al 2001, Dunne, Lusch, and Griffith 2002, Levy and Weitz 2001), some authors use the terms interchangeably and some try to develop distinctions However, at a conceptual level, our understanding of the terms is that there are potentially three different components involved in each one (1) production and inventory management, (2) relationship management, and (3) information technology (for a similar categorization, see Handfield and Nichols 1998)

In our model, we capture the first two components through the operational strategies variables (i e , postponement and speculation) and the governance mechanisms (i e , supplier qualification and incentive design), respectively To address the third component, we estimated an additional model that included a measure of electronic data interchange implementation in the relationships (1) between the apparel company and the (downstream) retailer and (2) between the apparel company and the (upstream) contractor, respectively None of the variables has a significant effect in the model Although our a priori expectation was that both variables would have an effect on downstream flexibility, we recognize that we may not have fully captured the phenomenon in our measure Thus, an important topic for further research is to specify in greater detail other components of supply chain initiatives, such as quick response and efficient customer response, to describe how each will manifest itself in a network and, most important, to outline the function of each component with respect to specific governance problems

Finally, a promising avenue for further research is expansion of the current model to include network effects at the customer level Conceivably, the way a manufacturer manages a focal customer relationship may affect, and be affected by, the firm's other customers We hope that future projects will be directed toward extending the unit of analysis in relationship research in this and other directions

Appendix
Response Formats and Scale Items

Downstream Market Uncertainty (MU; Seven-Point Semantic–Differential Scale: Predictable/Unpredictable)

- Consumer demand
- Sales forecasts
- Retail sales
- Consumer style preferences

Apparel Company Flexibility (ACF; Seven-Point Likert-Type Scale: Completely Inaccurate/Accurate Description of Apparel Company)

- Flexibility in response to requests for changes is a characteristic of this apparel company
- In this relationship, the apparel company is open to the idea of making changes, even after we have made an agreement
- In this relationship, the apparel company makes it possible for us to make adjustments to cope with changing circumstances
- This apparel company is open to modifying our agreement if unexpected events occur
- If a situation arises in which we have different assumptions about our agreement, this apparel company is open to working out a new deal that is acceptable to both of us
- When unexpected situations arise and we disagree on how to proceed, this apparel company is open to working out a new deal that is acceptable to both of us
- If our views differ regarding events in our relationship, this apparel company is open to developing a common understanding

Contractor Qualification (CQ; Seven-Point Likert-Type Scale: Minimal/Extensive Qualification Effort)

- Garment quality (e g , ability to meet specifications)
- Technical capability (e g , technical expertise)
- Manufacturing capability (e g , capacity)
- Financial strength
- Labor conditions (e g , workers are treated fairly)
- Price competitiveness
- Contractor's performance in other relationships
- Contractor's general business philosophy
- Contractor's reputation among other apparel companies
- Contractor's reputation among other contractors
- Contractor's reputation for on-time delivery

Contractor Hostages (CH; Seven-Point Likert-Type Scale: Strongly Disagree/Agree)

- If we canceled our sourcing agreement with this contractor, the contractor would be required to write off substantial investments
- If we canceled our sourcing agreement with this contractor, it would hurt this contractor's operations in the season in question
- If we canceled our sourcing agreement with this contractor, the contractor would have difficulty finding another apparel company to source for in the season in question
- If we canceled our sourcing agreement with this contractor, finding another apparel company to source for in the same season would have a negative impact on the price this contractor could charge

Apparel Company (Upstream) Hostages (ACUH; Seven-Point Likert-Type Scale: Strongly Disagree/Agree)

- Replacing this contractor for this particular garment would require us to write off substantial investments
- If we canceled our sourcing agreement with this contractor, we would have difficulty shipping the required quantity of this garment to the retailer on time for the season in question
- If we canceled our sourcing agreement with this contractor, we would be forced to compromise on the quality of this garment for the season in question
- If we canceled our sourcing agreement with this contractor, it would be difficult to find another contractor for this particular garment in the same season

Qualification by Retailer (RQ; Seven-Point Likert-Type Scale: Minimal/Extensive Qualification Effort)

- •Garment quality
- •Manufacturing capability (e g , capacity)
- •Financial strength
- •Price competitiveness
- •Apparel company's general business philosophy
- •Apparel company's reputation among other apparel companies
- •Apparel company's reputation among other retailers
- •Apparel company's quality reputation
- •Apparel company's reputation for on-time delivery

Retailer Hostages (RH; Seven-Point Likert-Type Scale: Strongly Disagree/Strongly Agree)

- •Replacing this apparel company for this particular garment would require us to write off substantial investments
- •If we canceled our purchase agreement with this apparel company, we would have difficulty obtaining the required quantity of this garment on time for the season in question
- •If we canceled our purchase agreement with this apparel company, we would be forced to compromise the quality of this garment for the season in question
- •If we canceled our purchase agreement with this apparel company, it would be difficult to find another apparel company for this particular garment in the same season

Apparel Company (Downstream) Hostages (ACDH; Seven-Point Likert-Type Scale: Strongly Disagree/Strongly Agree)

- •If we canceled our purchase agreement with this apparel company, the apparel company would be required to write off substantial investments
- •If we canceled our purchase agreement with this apparel company, it would hurt this apparel company's operations in the season in question
- •If we canceled our purchase agreement with this apparel company, the apparel company would have difficulty finding another retailer to sell to in the season in question
- •If we canceled our purchase agreement with this apparel company, finding another retailer to sell to in the same season would negatively impact the price this apparel company could charge

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Antecedents of Export Venture Performance: A Theoretical Model and Empirical Assessment

Both the size and the rapid growth of global exporting have focused the attention of marketing researchers on the factors associated with firms' export performance However, knowledge of this increasingly important domain of marketing activity remains limited To address this knowledge gap, the authors draw on the strategy and marketng literature to develop an integrative theory of the antecedents of export venture performance The interplay among available resources and capabilities, competitive strategy decisions, and competitive intensity determines export venture positional advantages and performance outcomes in the theoretical model The authors empirically assess predicted relationships using survey data from 287 export ventures Results broadly support the theoretical model, indicating that resources and capabilities affect export venture competitive strategy choices and the positional advantages achieved in the export market, which in turn affect export venture performance outcomes In contrast to structure–conduct–performance theory predictions, the data indicate that the competitive intensity of the export marketplace does not have a direct effect on export venture positional advantages or performance However, competitive intensity moderates the relationship between export venture competitive strategy choices and the positional advantages realized

Worldwide exporting has grown to exceed five trillion dollars annually and accounts for more than 10% of global economic activity (e g , Internaional Monetary Fund 2001, World Bank 2001) Because of ncreasing globalization, exporting is also a means of foreign market entry and sales expansion for firms, thus, it is a ignificant area of research interest in marketing (e g , Cavusgil and Kirpalani 1993, Samiee and Anckar 1998) Researchers have responded to managers' and policymakrs' interests by focusing attention on the internal (e g , nternational experience, standardization of marketing programs) and external (e g , industry technology, export market characteristics) antecedents of firms' export performance e g , Aaby and Slater 1989, Cavusgil and Zou 1994, Szymanski, Bharadwaj, and Varadarajan 1993) However, espite increased attention, theoretical and empirical knowldge of exporting remains limited and offers few insights for managers who are responsible for export performance and olicymakers who are concerned with export trade development (Czinkota 2000, Katsikeas, Leonidou, and Morgan 000)

The literature highlights three particular problems that mit existing research First, the majority of studies either are descriptive and largely atheoretic (Axinn 1994, Katsikeas, Leonidou, and Morgan 2000) or draw on a wide range of divergent theoretical perspectives (Aaby and Slater 1989, Zou and Stan 1998) The resulting lack of a comprehensive theory base for explaining firms' export performance makes it difficult to integrate findings from different studies into a coherent body of knowledge (e g , Aulakh, Kotabe, and Teegen 2000, Zou and Stan 1998) Second, the export venture (i e , the firm's efforts in a single product or product line exported to a specific foreign market) has been identified as the primary unit of analysis in understanding export performance (Ambler, Styles, and Xiucum 1999, Myers 1999) Despite this, most studies adopt a firm-level unit of analysis and aggregate firms' various product-market export ventures (Katsikeas, Leonidou, and Morgan 2000, Madsen 1987), which makes it difficult to identify and isolate specific antecedents of export performance because firm-level analyses fail to capture differences in the strategies executed by export ventures that face various marketplace requirements (Ambler, Styles, and Xiucum 1999, Cavusgil and Zou 1994) Third, export performance is multidimensional, incorporating both economic and strategic dimensions (Bello and Gilliland 1997, Zou, Taylor, and Osland 1998) However, most studies use individual performance measures, such as the firm's export ratio, which may not represent important economic and strategic aspects of export performance (e g , Cavusgil and Zou 1994, Shoham 1998) In addition, the many unrelated performance indicators used in different studies also make integration of empirical findings problematic (Aaby and Slater 1989, Aulakh, Kotabe, and Teegen 2000, Diamantopoulos 1998)

In this article, we address these three problems We develop and empirically assess a comprehensive theory of

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export venture performance. Our study makes three contributions to knowledge in this increasingly important domain of marketing activity. First, we integrate the structure–conduct–performance (SCP) paradigm and the resource-based view (RBV), two rival theories that often have been viewed as incongruent, into a cohesive theoretical model of the antecedents of export venture performance. We present empirical evidence of the interplay between the resources and capabilities available to export ventures, competitive strategy decisions, and the competitive intensity of the export market served in determining export venture positional advantages and performance outcomes that support key relationships in our theoretical model. Our study provides an important new theory base on which to build further export research and to integrate findings, and it offers new insights for managers and policymakers. Second, our study provides new evidence as to how competitive intensity affects export venture performance, which has important implications for theory development. In contrast to SCP predictions, our results indicate that competitive intensity does not directly influence export venture positional advantage and performance outcomes. Rather, we show that competitive intensity moderates the relationship between the export venture's intended competitive strategy and its realized positional advantage. Third, our study provides empirical support for previously untested marketing theory propositions regarding the effects of resources and capabilities on business performance (e.g., Bharadwaj, Varadarajan, and Fahy 1993, Day 1994, Hunt and Morgan 1995). We also extend RBV theory in marketing by distinguishing between firms' resource endowments and the capabilities with which they are developed and deployed as sources of positional advantage (Teece, Pisano, and Shuen 1997).

We begin by integrating insights from established theory in economics and resource-based strategy with emerging theories of dynamic capabilities to develop a comprehensive theoretical model of key antecedents of export venture performance. Next, we draw on qualitative fieldwork and literature-based insights to specify relevant constructs. After describing our research design, we validate our measures and estimate a structural model that represents key relationships predicted by our theory. We then present results of the analysis and explore their theoretical, managerial, and policymaking implications. Finally, we assess the limitations of our study and suggest areas for further research.

Theoretical Model

Antecedents of Export Venture Performance

Two broad theoretical approaches, the SCP paradigm and the RBV, dominate explanations of firm performance. Of the few theory-based exporting studies that have been conducted, most have examined the antecedents of export performance from an SCP viewpoint (e.g., Aaby and Slater 1989, Axinn 1994, Cavusgil and Zou 1994, Zou and Stan 1998). The SCP paradigm posits that firm performance is determined primarily by two fundamental sets of antecedents. First is the structural characteristics of the firm's markets that determine the competitive intensity (or rivalry) the firm faces. In the export venture context, competitive intensity concerns the degree to which rivals in the target export marketplace are able and willing to respond to the actions of the firm's export venture (e.g., Jaworski and Kohli 1993, Porter 1980). The second antecedent is the firm's ability to achieve and sustain positional advantages through the efficient and effective execution of planned competitive strategy (Porter 1980, 1985, Scherer and Ross 1990). In this context, positional advantage pertains to the relative superiority of the export venture's value offering to customers in the target export market and the cost of delivering this realized value (Day and Wensley 1988, Porter 1985). Export venture competitive strategies are planned patterns of resource and capability deployments that support choices about how the venture will compete for target customers and achieve its desired goals (e.g., Aulakh, Kotabe, and Teegen 2000, Bharadwaj, Varadarajan, and Fahy 1993).

In contrast, the RBV emphasizes resources as central to understanding firm performance (e.g., Amit and Shoemaker 1993, Peteraf 1993). In this domain, recent theoretical contributions regarding dynamic capabilities distinguish between capabilities and other types of resources available to the firm (e.g., Makadok 2001, Teece, Pisano, and Shuen 1997). In the export venture context, resources are the firm-controlled asset stocks that constitute the raw materials available to the firm's export venture business units (e.g., Black and Boal 1994, Peteraf 1993). Capabilities are the organizational processes by which available resources are developed, combined, and transformed into value offerings for the export market (e.g., Amit and Shoemaker 1993, Day 1994). The RBV characterizes firms as idiosyncratic bundles of resources and capabilities that are available for deployment by the firm's business units (e.g., Conner 1991, Hamel and Prahalad 1994). Heterogeneity in the resources and capabilities explains variations in firm performance (Makadok 2001, Teece, Pisano, and Shuen 1997). From this perspective, export venture managers deploy available firm-specific resources and capabilities that result in positional advantage in the export market (Barney 1991, Grant 1991). Firms sustain an advantage if rivals are unable to acquire and deploy a similar or substitute mix of resources and capabilities (Dierickx and Cool 1989, Mahoney and Pandian 1992).

The SCP and RBV approaches historically have been positioned as competing theories that offer incongruen explanations of firm performance (e.g., Porter 1991, Spanos and Lioukas 2001). However, as we suggest in Figure 1, a dynamic view of business performance as a process (March and Sutton 1997, Van de Ven 1992), with identifiable stage and linkages between them, enables the two different viewpoints to be synthesized into a robust theoretical model o the antecedents of export venture performance.

Resources and Capabilities: Insights from RBV Theory

Consistent with RBV and dynamic capabilities theory, ou theoretical model indicates that both the resources and th capabilities available to the export venture have a direc effect on the venture's positional advantage in its targe export market (e.g., Collis 1995, Day and Wensley 1988) For example, reputational assets may translate directly int

FIGURE 1
A Theoretical Model of the Antecedents of Export Venture Performance

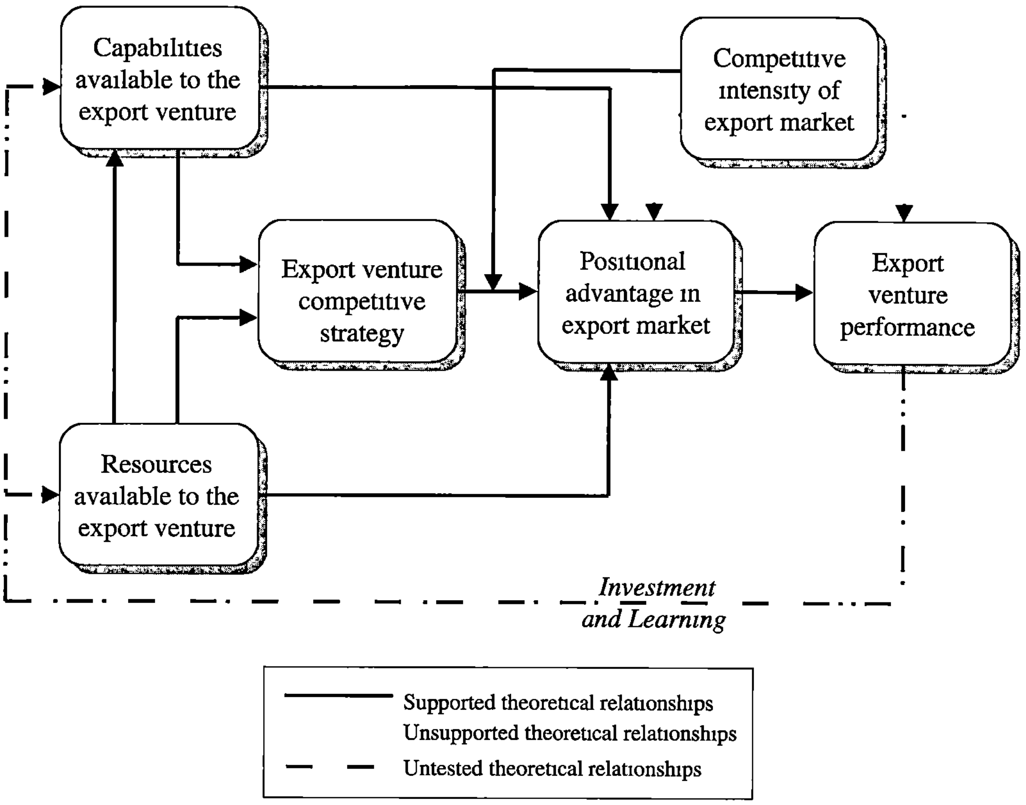
Capabilities available to the export venture
Competitive intensity of export market
Export venture competitive strategy
Positional advantage in export market
Export venture performance
Resources available to the export venture
Investment and Learning
Supported theoretical relationships
Unsupported theoretical relationships
Untested theoretical relationships

image-related positional advantages, and relationship-building capabilities may directly create relationship-based advantages (e g , Day 1994, Srivastava, Shervani, and Fahey 1998) Resources, as inputs to the complementary capabilities with which available resources are combined and transformed to create value offerings, also have an indirect effect on positional advantage (e g , Oliver 1997, Teece, Pisano, and Shuen 1997) For example, export-market-knowledge resources can be leveraged with complementary product development capabilities to create superior value offerings for the export market (e g , Calantone, Schmidt, and Song 1996)

Competitive Strategy: Insights from SCP Theory

In addition to the direct resource and capability–positional advantage linkages, our theoretical model draws on SCP theory to posit that these relationships are mediated by the competitive strategy that the export venture pursues (e g , Hunt 2000, Spanos and Lioukas 2001) Competitive strategy mediates the relationship between an export venture's available resources and capabilities and its positional advantage by determining (1) how well available resources and capabilities are matched with market requirements (Collis 1995, Teece, Pisano, and Shuen 1997), (2) the appropriateness of planned resource and capability allocations (Castanias and Helfat 1991, Oliver 1997), and (3) the quality of strategy implementation (Day and Wensley 1988, Dickson 1992) Thus, our theoretical model posits that both the strategic choices about how the venture will compete for target customers and the combinations of available resources and capabilities to be deployed in the export market mediate linkages among available resources and capabilities and the positional advantages achieved by the export venture (Conner 1991, Grant 1991)

Competitive Intensity: Insights from SCP and RBV Theories

A fundamental premise in SCP theory is that the structural forces that determine competitive intensity in a market have a strong impact on firm performance (McGahan and Porter 1997, Scherer and Ross 1990) Thus, SCP theory posits that the level of competitive intensity is an essential determinant of market attractiveness (e g , Porter 1980, 1985), whereas RBV theory treats competitive intensity as a less significant issue Nonetheless, RBV theory posits that rivals' willingness and ability to imitate a firm's strategy or to use substitute resources and capabilities to deliver an equal value proposition determine the extent to which a firm's positional advantage may be "competed away" (Barney 1991, Conner 1991, Dierickx and Cool 1989) Our theoretical model posits three ways that competitive intensity in the target export market affects export venture performance First, rivals' ability to take independent strategic actions and to respond to the export venture's competitive strategy moves moderates the venture's success in translating its planned competitive strategy into realized positional advantages (cf

Jaworski and Kohli 1993). This may occur because the export venture fails to anticipate correctly rivals' independent strategic actions in planning its competitive strategy and because of rivals' responses to the venture's own competitive strategy moves. Second, because the export venture's positional advantage is relative to the positions of its rivals, competitive intensity also has a direct, negative impact on a venture's positional advantage (Cavusgil and Zou 1994). Third, competitive intensity affects the likelihood of price competition, the cost of achieving realized positional advantages (Porter 1980, 1985), and distributor and customer choices (Day and Wensley 1988). Thus, competitive intensity also directly affects export venture performance.

Positional Advantage and Export Venture Performance

Positional advantages are direct antecedents of export venture performance because the relative superiority of a venture's value offering determines target customers' buying behavior (Anderson, Fornell, and Lehmann 1994, Piercy, Kaleka, and Katsikeas 1998) and the outcomes of this behavior for the export venture (Cavusgil and Zou 1994, Karnani 1984). Our theoretical model considers both economic and strategic dimensions of export venture performance (Bello and Gilliland 1997, Zou, Taylor, and Osland 1998). Economic elements include the achievement of economic goals (e.g., sales and market share) and the resources consumed in doing so (cf. Peng and York 2001). Strategic performance elements include the achievement of other goals, such as the establishment and maintenance of relationships with key channel members in the target export market (Cavusgil and Zou 1994). Although both economic and strategic elements are important dimensions of export venture performance, there may be trade-offs between them in the short run (Aaby and Slater 1989). Therefore, our theoretical model posits that an export venture's positional advantage affects the venture's economic and strategic performance (Katsikeas, Leonidou, and Morgan 2000).

Dynamic Considerations: Insights from RBV and Dynamic Capabilities Theories

For any theory of business performance to be useful, it must be dynamic (Porter 1991). Our theoretical model is explicitly dynamic. We view the relationships predicted among resources, capabilities, competitive strategy, positional advantage, and performance as stages in the export performance process (March and Sutton 1997, Ven de Ven 1992). In addition, we posit two particular dynamic relationships in our theoretical model. First, RBV theory indicates that some of the economic outcomes of positional advantages will be reinvested to acquire or to develop available resources and capabilities (Grant 1991, Hamel and Prahalad 1994). In the same vein, marketing theory indicates that strategic outcomes, such as relationships with customers and channel members, often become "market-based assets" that add to the firm's existing resource stock (Srivastava, Shervani, and Fahey 1998). Second, RBV and dynamic capabilities theories indicate that because of learning effects, many resources and most capabilities are enhanced by use (Grant 1996). For example, export market knowledge and relationship-building capabilities are likely enhanced as a result of the experiential learning that is associated with their use in planning, executing, and monitoring the outcomes of competitive strategy decisions (Day 1994, Morgan et al. 2003).

Theoretical Model Summary

By integrating RBV and SCP predictions in a dynamic model of export performance, the main premise of our theoretical model (Figure 1) is that export ventures can achieve positional advantages in foreign markets and, in turn, superior performance by deploying available resources and capabilities while pursuing appropriate export venture competitive strategies. Furthermore, we theorize that competitive intensity in the export market directly affects the export venture's positional advantages and performance outcomes and limits its ability to execute competitive strategy decisions. Our theoretical model indicates that an export venture's performance is sustained over time by reinvestment, the creation of market-based assets, and learning effects that build and enhance the resources and capabilities available to the export venture.

An Empirical Assessment of Key Theoretical Relationships

As an integrative general theory of export venture performance, we conceptualized our theoretical model at the same level as the SCP and RBV theories on which it draws. Assessing relationships at this level of analysis required us to treat the variables in our model as higher-order constructs (e.g., Matsuno and Mentzer 2000, Zou and Cavusgil 2002). This necessitates the identification of relevant dimensions of the constructs in our model (Bagozzi 1994, Heide and John 1992). In addition, because the absence of relevant secondary data sources requires primary data collection to assess our theoretical model, we needed to identify or develop valid and reliable measures of each of the dimensions of our theoretical constructs. The difficulties of longitudinal data collection in export ventures preclude a time-series assessment of predicted dynamic relationships (Katsikeas, Leonidou, and Morgan 2000). However, cross-sectional primary data enable us to assess key relationships in our theoretical model. To this end, to identify specific dimensions of each of the higher-order constructs in our model and to guide the development of appropriate measures, we synthesized insights from exploratory fieldwork interviews and existing literature.

The fieldwork involved 17 in-depth interviews, each of which lasted one and a half to two hours, with marketing managers, international business development managers, chief executive officers, and account development managers in different firms from a cross-section of industries, including textiles, carpets, and rugs (Standard Industrial Classification [SIC] code 22), finished apparel (SIC code 23), chemicals, plastics, paints, and cosmetics (SIC code 28), rubber and plastic products (SIC code 30), engines, machinery, and computing and office equipment (SIC code 35), and electronic and electrical components and appliances (SIC code 36). Overall, the interviewed managers were responsible for 29 export ventures In addition to providing insights into the identification and measurement of dimensions that represent our theoretical constructs, the fieldwork interviews also provided important support for the face validity of our theoretical model

Resources Available to the Export Venture

Although many different kinds of resources may be available, four emerged as particularly important in our fieldwork First, experiential resources, such as market and process knowledge gained from the firm's overseas market operations experience, enable the venture's marketing programs to match the needs of channel members and customers (Daily, Certo, and Dalton 2000, Morgan et al 2003) Second, scale resources, which pertain to the size and scope of the firm's operations, significantly affect cost structures and influence competitive strategy and performance (e g, Cavusgil and Zou 1994, Cooper and Kleinschmidt 1985) Third, the working capital and financial liquidity requirements of export operations mean that access to financial resources is essential (Gomez-Mejia 1988, Tseng and Yu 1991) Fourth, physical resources, such as modern equipment and access to valuable supply sources that facilitate process efficiency and product effectiveness, can also be important sources of advantage in export markets (Cavusgil and Naor 1987, Leonidou, Katsikeas, and Piercy 1998)

Capabilities Available to the Export Venture

The literature and fieldwork interviews suggest three particularly important types of capabilities First, informational capabilities, which pertain to the acquisition and dissemination of information about customers, competitors, channels, and the broader export market environment, help reduce uncertainty in export marketing (Katsikeas and Morgan 1994, Souchon and Diamantopoulos 1996) Second, relationship-building capabilities (with suppliers, customers, and other channel members) enable better understanding of and response to export market requirements (Bello, Urban, and Verhage 1991, Rosenbloom and Larsen 1992) Third, product development capabilities, which include existing product modification and new product development, affect the venture's effectiveness and efficiency in delivering superior value to the target market (Calantone, Schmidt, and Song 1996, Cooper and Kleinschmidt 1985)

Export Venture Competitive Strategy

We identified three key areas of planned resource and capability deployment that support a venture's strategic choices in competing for target customers First, cost leadership, such as investments in new manufacturing technologies, enhances efficiency in the delivery of value offerings to customers (Aulakh, Kotabe, and Teegen 2000, Hill 1988, Sullivan and Bauerschmidt 1991) Second, marketing differentiation, such as investments in promotional and brand development activities, enables the delivery of a distinctive value offering to customers (Samiee and Roth 1992, Styles and Ambler 1994) Third, service differentiation, such as the implementation of customer-service programs that offer higher levels of customer support than do competitors' programs, enhance customer value (Cavusgil and Zou 1994, Roth and Morrison 1992)

Positional Advantage in the Export Market

We identified three types of positional advantage that have particular relevance to export venture performance (1) cost advantage, which involves the resources consumed in producing and marketing the venture's value offering and affects price and perceived value in the export market (cf Kotha and Nair 1995), (2) product advantage, which denotes quality, design, and other product attributes that differentiate the venture's value offering from those of competitors (Kim and Lim 1988, Song and Parry 1997), and (3) service advantage, which includes service-related components of the value offering, such as delivery speed and reliability and after-sales service quality (cf Li and Dant 1999)

Export Venture Performance

Theory indicates that important aspects of economic performance are effectiveness (i e, the extent to which desired goals are achieved), efficiency (i e, the ratio of performance outcomes achieved to the resources consumed), and adaptability (i e, the export venture's ability to respond to environmental changes) (Walker and Ruekert 1987) The literature, along with our fieldwork, suggests that strategic elements of export venture performance center primarily on two different stakeholders distributors and end-user customers (Cavusgil and Zou 1994, Peng and York 2001) In particular, export ventures often monitor their performance with respect to desired customer attitudes and behaviors (e g, customer satisfaction and retention) and those of channel intermediaries (e g, distributor loyalty) (Katsikeas, Leonidou, and Morgan 2000)

Export Market Competitive Intensity

Our fieldwork supports previous research that has identified the willingness and ability of rivals to respond to competitive moves in the export market as an important antecedent of export venture performance (Cavusgil and Zou 1994)

Research Method

Manufactured exports account for the bulk of total world export trade (World Bank 2001) Therefore, we empirically assessed our theoretical model in a field study of manufacturing firms that operate in the same SICs as firms in our previous fieldwork We excluded service firms and firms engaged in primary industries because of their idiosyncratic international expansion patterns, regulatory requirements, and performance characteristics (Zou and Cavusgil 2002) We used a multi-industry sample to increase observed variance and to strengthen the generalizability of the findings (e g, Bello and Gilliland 1997, Samiee and Anckar 1998) Most firms in the SICs in our sample export through foreign distributors because this provides relatively easy and low-cost export market access (Bello and Gilliland 1997, Peng and York 2001) To facilitate the development of valid measures and provide greater control over extraneous sources of variation, we therefore focused on only firms that exported through foreign distributors (cf Dutta, Heide, and Bergen 1999)

Measures

We began by combining fieldwork and literature-based insights to specify the domain of each of the 17 construct dimensions we identified and to develop items that could serve as indicators of each construct A preliminary survey instrument was developed and then evaluated by nine academic researchers in international marketing and competitive strategy who served as expert judges to assess face validity Next, to evaluate individual item content, clarity of instructions, and response format, we pretested the revised survey in a series of face-to-face settings with 12 export venture managers The survey was further refined by means of the feedback and was then pretested by mail No particular problems were detected with the survey instrument The final questionnaire used multi-item measures with seven-point scales to measure all constructs Appendix A provides the complete set of items as well as their scale anchors and reliability coefficients

Sample and Data Collection

We drew a random sample from the Dun & Bradstreet database of 1000 manufacturing firms that were involved in exporting and that employed between 50 and 1000 full-time personnel We contacted each firm by telephone to identify the firms that had export venture activities through overseas distributors for at least five years, to identify an appropriate key informant for the study, and to prenotify the firm of the research project After multiple telephone calls and successive snowballing in many cases, we identified 601 people who were responsible for specific export ventures, who met the key informant knowledgeability requirements, and who were willing to complete our survey Of the 399 firms excluded in this process, 11 could not be contacted because of incorrect contact details, 68 traded directly with only a few export customers, 96 had been engaged in export venture activities for less than five years, 11 were local export intermediaries, 22 had discontinued exporting or employed less than 50 personnel, 8 had ceased operations entirely, and 183 reported a corporate policy of nonparticipation in external studies

A survey packet was mailed to each of the 601 key informants Respondents were asked to provide information for a specific export venture of the firm in which only one foreign distributor had been employed to sell the focal product in the venture market for at least five years This enabled us to control for potential confounding factors associated with the use of multiple foreign distributors in a particular export venture market (Bello and Gilliland 1997) and to collect data on established export venture activities, which is essential in studying export venture performance (Cavusgil and Zou 1994) [1] To ensure variation in export venture performance, we developed three versions of the survey One version asked informants to respond with regard to one of their more successful export ventures, the other two focused respectively on averagely successful or less successful export ventures (cf Weiss, Anderson, and MacInnis 1999) [2] The initial mailing, a follow-up postcard, and two further waves of surveys produced 332 responses Of these, 21 failed our informant competency tests (discussed subsequently), 15 had excessive missing data (missing responses on three or more items on any single scale, see Fitzgerald et al 1997), and 9 were from export ventures that used multiple foreign distributors These responses all were dropped from subsequent analysis, leaving a data set that comprised observations from 287 export ventures, for a response rate of 48% Key demographic characteristics of the 287 export ventures in our data set are presented in Appendix B

To assess potential nonresponse bias, we compared early and late respondents with respect to various firm characteristics, including number of full-time employees, years of exporting, annual sales volume, age of the venture, number of export markets, key informant self-reported competency evaluation indicators, and the construct measures (Armstrong and Overton 1977) We detected no significant differences between early and late respondents In addition, using secondary information on employee numbers and annual sales volume, we also compared the respondent firms and a group of 87 randomly selected nonparticipant firms We found no differences between respondents and nonrespondents We concluded that nonresponse bias was not a significant problem in our data

In addition to the presurvey telephone screening to identify appropriate informants, we also conducted a *post hoc* check for respondent competency We collected data that tapped each respondent's knowledge of the activities, strategies, and performance of his or her export venture and those of its main export market competitors (cf Jap 1999), involvement with the export venture's foreign distributor (cf Heide and John 1992), responsibility for export venture strategy decisions (cf Weiss, Anderson, and MacInnis 1999), and confidence in answering the survey questions (Cannon and Perreault 1999) We eliminated from further analysis the 21 respondents who reported a score of less than 4 on the seven-point scales for any one of these items In the final data set (n = 287), the mean informant scores were greater than 6 0 on seven-point scales for all items except knowledge of the venture's main competitors, which had a mean score of 5 43 This indicates a high level of competency among our key informants

We validated the data collected from our key informants in several ways First, we attempted to gather data from a second informant in each respondent venture In export ventures, usually only one manager is responsible for and knowledgeable about the full range of each venture's plans and activities Even so, in 34 cases we were able to collect data from a knowledgeable second informant Interrater reports were positively correlated, at levels ranging from 34 ($p <$ 05) for export venture positional advantage to 74 ($p <$ 01) for export venture competitive strategy Second, we gathered data about the distributor and customer dimensions of export venture performance from 22 overseas distributors used by export ventures in our sample[3] Correlations between export venture manager and distributor responses for these export ventures were 60 ($p <$ 01) and 40 ($p <$ 10) for the distributor and end-user customer dimensions of venture performance, respectively In the absence of secondary data sources to validate the economic dimension of export venture performance, we subsequently contacted the companies in our sample and requested their cooperation in providing us with objective financial performance data We were able to collect primary objective economic performance data on sales volume, market share, relative profit margins, and revenue from new products for 31 of the export ventures in our sample We correlated these objective data with the relevant indicators of economic performance that we used in our export venture performance measure (ECON1–4, Appendix A) at the level of 89 ($p <$ 01), 89 ($p <$ 01), 88 ($p <$ 01), and 81 ($p <$ 01), respectively Collectively, the three sets of additional data provide strong support for the validity of our key informant data[4]

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[1] The field interviews suggested that the use of a single foreign distributor in the export venture market is a common approach, particularly among more experienced exporting firms for which building close relationships with a prime distributor is considered essential in penetrating overseas markets (cf Kalwani and Narayandas 1995)

[2] Paired t-tests on managers responding for more successful, averagely successful, and less successful export ventures revealed significant differences in performance in the expected direction among each of the three groups

Analysis and Results

Measure Validation

We purified our measures using exploratory factor analysis and reliability analysis We retained items with high item-to-total correlations, high loadings on the intended factors, and no substantial cross-loadings We then subjected the set of items to confirmatory factor analysis (CFA) to verify the hypothesized factor structure With the exception of competitive intensity, we considered each construct in our theoretical model as representing a higher-order factor, with the observed items originating from first-order factors that in turn arise from a second-order factor (cf Heide and John 1992) Given the number of parameters to be estimated, sample-size constraints (Bentler and Chou 1987) led us to divide our measures into three subsets of the most theoretically related variables (e g , Kohli and Jaworski 1994, Moorman and Miner 1997) In each measurement model, we used the elliptical reweighted least squares estimation procedure, which yields unbiased parameter estimates for both multivariate normal and nonnormal data (Sharma, Durvasula, and Dillon 1989, Zou and Cavusgil 2002)

Measurement Model 1 in Table 1 estimates resources available to the export venture as a second-order factor that comprises experiential, scale, financial, and physical resources, and it estimates capabilities available to the export venture as a second-order factor comprising informational, relationship-building, and product development capabilities Although the chi-square statistic of Measurement Model 1 is significant ($\chi^2_{(222)}$ = 463 66, $p <$ 001), as might be expected given the sensitivity of the test statistic to sample size (Bagozzi and Yi 1988), the other fit indexes (comparative fit index [CFI] = 97, nonnormed fit index [NNFI] = 96, root mean square error of approximation [RMSEA] = 062, and average off-diagonal standardized residual [AOSR] = 064) suggest good model fit In Measurement Model 2, Table 1, we estimated export venture competitive strategy as a second-order factor comprising cost leadership, marketing differentiation, and service differentiation, and we estimated positional advantage in the export market as a second-order factor comprising cost, product, and service advantage This model also represents a close fit to the data ($\chi^2_{(163)}$ = 264 12, $p <$ 001, CFI = 96, NNFI = 96, RMSEA = 047, and AOSR = 048) Measurement Model 3, Table 1, estimates export venture performance as a second-order factor comprising economic, distributor, and end-user customer performance, and it estimates competitive intensity as a separate first-order construct The results also suggest good fit for this model ($\chi^2_{(131)}$ = 248 66, $p <$ 001, CFI = 97, NNFI = 97, RMSEA = 056, and AOSR = 041)

All three measurement models support our conceptualization of the resources and capabilities available to export ventures, competitive strategy, positional advantage, and performance as separate second-order constructs and competitive intensity as a separate first-order construct[5] As is shown in Table 1, all factors and items load significantly on designated constructs, and there is no evidence of any cross-loading Factor and item loadings all exceed 52, and all t-values are greater than 8 55, which provides evidence of convergent validity among our measures (Fornell and Larcker 1981) We assessed discriminant validity among all of our measures by using two-factor CFA models that involved each possible pair of constructs, we freely estimated and then constrained to one the correlation between the two constructs In all cases, the chi-square value of the unconstrained model was significantly less than that of the constrained model, providing evidence of discriminant validity between all of our constructs (Bagozzi, Yi, and Phillips

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[3] In line with previous research (e g , Bello and Gilliland 1997, Cavusgil and Zou 1994), we used self-reported performance measures because (1) our interviews indicated that managers are often unwilling to disclose objective performance data, (2) such export venture–specific information is not provided in company financial statements (Katsikeas, Leonidou, and Morgan 2000), (3) managerial decisions and actions are driven by perceptions of export performance (cf Day and Nedungadi 1994), and (4) perceptual measures have been shown to yield reliable and valid performance indicators (Dess and Robinson 1984, Venkatraman and Ramanujam 1987)

[4] In addition, we followed Podsakoff and Organ's (1986) approach to assess the degree to which common method variance may be present in our data If this is the case, a CFA containing all constructs should yield a single method factor The fit indexes for a single-factor model (CFI = 67, NNFI = 69, RMSEA = 13, and AOSR = 13) suggest a poor model fit, indicating that common method bias alone is not likely to explain any observed relationships between our model variables

[5] We also compared each measurement model with an alternative single-factor model, and in each case, chi-square difference evaluations strongly supported the hypothesized measurement model

TABLE 1
Construct Measurement Models

Measurement Model 1				Measurement Model 2				Measurement Model 3			
Available Resources		Available Capabilities		Competitive Strategy		Positional Advantage		Export Performance		Competitive Intensity	
First-Order Factors	Standardized Loadings^a	First-Order Factors	Standardized Loadings^a	First-Order Factors	Standardized Loadings^a	First-Order Factors	Standardized Loadings^a	First-Order Factors	Standardized Loadings^a	First-Order Factors	Standardized Loadings^a
Experiential		Informational		Cost Leadership		Cost Advantage		Economic		Competitive Intensity	
EXP1	83^b	INF1	71^b	COS1	62^b	ACOS1	94^b	ECON1	90^b	COMP1	68^b
EXP2	52 (8 55)	INF2	73 (10 68)	COS2	66 (7 08)	ACOS2	70 (14 78)	ECON2	90 (19 18)	COMP2	73 (9 38)
EXP3	92 (18 28)	INF3	85 (12 32)	COS3	77 (7 21)	ACOS3	96 (30 09)	ECON3	73 (13 95)	COMP3	62 (8 22)
EXP4	88 (17 28)	INF4	84 (12 30)			ACOS4	79 (18 32)	ECON4	74 (14 17)	COMP4	70 (9 09)
		INF5	67 (9 89)	Marketing Differentiation						COMP5	65 (8 57)
Scale				MAR1	78^b	Product Advantage		Distributor			
SCL1	86^b	Relationship Building		MAR2	76 (9 84)	APRD1	81^b	DIS1	67^b		
SCL2	92 (17 34)	REL1	78^b	MAR3	74 (9 76)	APRD2	73 (10 27)	DIS2	76 (10 58)		
SCL3	69 (12 42)	REL2	76 (12 29)			APRD3	65 (9 47)	DIS3	84 (11 40)		
		REL3	91 (14 03)	Service Differentiation				DIS4	71 (9 95)		
Financial				SER1	61^b	Service Advantage		DIS5	80 (11 03)		
FIN1	89^b	Product Development		SER2	76 (8 63)	ASER1	68^b				
FIN2	93 (14 38)	PRD1	87^b	SER3	86 (8 57)	ASER2	79 (9 71)	End User			
		PRD2	87 (13 15)			ASER3	60 (8 14)	END1	64^b		
Physical		PRD3	66 (10 80)			ASER4	61 (8 30)	END2	78 (9 97)		
PHY1	78^b							END3	72 (9 33)		
PHY2	77 (11 58)							END4	83 (10 32)		
PHY3	81 (11 98)										
Goodness-of-Fit Statistics				Goodness-of-Fit Statistics				Goodness-of-Fit Statistics			
$\chi^2_{(222)} = 463\ 66$, $p < 001$				$\chi^2_{(163)} = 264\ 12$, $p < 001$				$\chi^2_{(131)} = 248\ 66$, $p < 001$			
CFI = 97				CFI = 96				CFI = 97			
NNFI = 96				NNFI = 96				NNFI = 97			
RMSEA = 062				RMSEA = 047				RMSEA = 056			
AOSR = 064				AOSR = 048				AOSR = 041			

[a] The t-values from the unstandardized solution are in parentheses

[b] Fixed parameter

1991)[6] The descriptive statistics and correlations in Table 2 provide a general picture of the constructs and measures All measures exhibit satisfactory levels of reliability, and coefficient alphas range from 71 to 90 (see Appendix A) Overall, we conclude that our constructs exhibit good measurement properties

Structural Model Estimation

To attain the ratio of sample size to parameter of greater than 5 to 1 that is suggested for reliable parameter estimates, we adopted a parsimonious approach to estimate our structural model (Bentler 1995, Bollen 1989) We used weighted composite scales, based on the first-order factor loadings of the measurement models in Table 1, to represent the first-order factors, and, apart from competitive intensity that is viewed as a first-order construct, we then employed these as indicators of the corresponding higher-order latent construct (e g , Fitzgerald et al 1997, Hart 1999) Standardized parameter estimates, t-values, and significance levels for the structural paths are shown in Table 3 Overall, the fit indexes for the structural model ($\chi^2_{(111)}$ = 234 56, $p <$ 001, CFI = 94, NNFI = 93, RMSEA = 062, and AOSR = 056) suggest good fit to the data The results indicate that except for three paths (linking competitive strategy with positional advantage and competitive intensity with positional advantage and performance) that we found to be insignificant, all remaining paths proposed in our theoretical model are significant and in the expected direction Furthermore, the structural model exhibits good explanatory power, squared multiple correlations are 31 for the capabilities available to the export venture, 21 for export venture competitive strategy, 64 for positional advantage in export market, and 76 for export venture performance

Although our structural model assesses two of the relationships involving competitive intensity in the export market that we predict in our theoretical model, testing the third prediction (that competitive intensity moderates the relationship between competitive strategy and positional advantage) required an additional analysis To assess this relationship, we split our sample into two groups at the median level of competitive intensity and reestimated our structural model (e g , Hewett and Bearden 2001, Osterhaus 1997) We estimated two models one in which we constrained the path between competitive strategy and positional advantage to be equal across the two groups and one in which we allowed the path coefficients to vary freely A highly significant chi-square difference ($\Delta\chi^2_{(1)}$ = 8 57, $p <$ 001) signifies much better fit for the unconstrained model, thus indicating that the relationship between competitive strategy and positional advantage is different in the two groups As is shown in Table 3, the two-group moderator test supports the prediction of our theoretical model In the low-competitive-intensity group, the competitive strategy–positional advantage relationship is positive and significant (path coefficient = 43, t-value = 2 16), whereas in the high-competitive-intensity group, the relationship is not significant (path coefficient = – 01, t-value = – 09)

Discussion and Implications

Adopting a dynamic process conceptualization of export venture performance, our theoretical model integrates RBV and SCP perspectives to explain how the resources and capabilities available to export ventures, competitive strategy choices, and competitive intensity in the export market interact to determine export venture positional advantage and performance Our empirical assessment of key relationships predicted in our theoretical model indicates support for seven of the ten relationships we examined, and it explains 76% of the variance in export venture performance in our sample Our findings indicate that export venture performance is strongly related to its positional advantage in the marketplace Positional advantage, in turn, is directly connected with the availability of key resources and capabilities Furthermore, our research reveals that the key resources and capabilities are linked with each other and are directly connected with the export venture's competitive strategy choices

Our data do not support the predicted relationship between export venture competitive strategy and positional advantage (path coefficient = 12, t-value = 1 30) However, our two-group moderator analysis indicates that this relationship is positive and significant when the level of competitive intensity in the export market is low Our findings are consistent with suggestions that gaps between "intended" and "realized" strategy are common and are often caused by rivals' actions and reactions (e g , Day and Wensley 1988, Roth 1995) This can result both from rivals making unanticipated independent competitive moves and from rivals reacting to the venture's strategy implementation moves in ways that reduce their impact on positional advantage (Mintzberg and Waters 1985, Song and Parry 1997) The two remaining unsupported relationships predicted in our theoretical model are those that link competitive intensity in the export market with the export venture's positional advantage (path coefficient = 03, t-value = 32) and performance (path coefficient = – 11, t-value = –1 45)

Overall, the empirical results provide broad support for our theoretical model From an RBV theory perspective, support is particularly strong for the resource and capability antecedents of export venture positional advantage and performance that we identify Our findings indicate less support for two related SCP-based aspects of our theoretical model First, our findings suggest that competitive intensity is less important in directly determining export venture positional advantage and performance than SCP theory suggests (e g , Porter 1985, Scherer and Ross 1990) Second, in contrast to the key SCP premise that appropriate competitive strategy choices lead to positional advantage, our data indicate that competitive strategy choices are only related to positional advantage outcomes in less competitively intense export

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[6] Discriminant validity is evident, as the results indicate that the critical value ($\Delta\chi^2_{(1)}$ = 3 84) was comfortably exceeded in all pairwise comparison tests resources with capabilities ($\Delta\chi^2_{(1)}$ = 26 73), strategy ($\Delta\chi^2_{(1)}$ = 10 30), positional advantage ($\Delta\chi^2_{(1)}$ = 28 30), and performance ($\Delta\chi^2_{(1)}$ = 30 78), capabilities with strategy ($\Delta\chi^2_{(1)}$ = 19 87), positional advantage ($\Delta\chi^2_{(1)}$ = 15 23), and performance ($\Delta\chi^2_{(1)}$ = 73 53), strategy with positional advantage ($\Delta\chi^2_{(1)}$ = 16 83) and performance ($\Delta\chi^2_{(1)}$ = 19 53), and positional advantage with performance ($\Delta\chi^2_{(1)}$ = 52 80)

TABLE 2
Construct and Measure Means, Standard Deviations, and Intercorrelations

Constructs and Measures	Mean	S.D	RES1	RES2	RES3	RES4	CAP	CAP1	CAP2	CAP3	STR	STR1	STR2	STR3	ADV	ADV1	ADV2	ADV3	PRF	PRF1	PRF2	PRF3	CIN
Resources Available (RES)	**4.29**	**.98**					**.49**				**28**				**.44**				**.49**				**01**
RES1 Experiential	4 90	1 31	1 0																				
RES2 Scale	[illegible]	[illegible]	46	1 0																			
Financial	4.14	1.44	31	52	1 0																		
RES4 Physical	4.45	.92	26	.50	47	1 0																	
Capabilities Available (CAP)	**4.97**	**.79**					**1.0**				**.32**				**.44**				**.58**				**–.09**
CAP1 Informational	4 55	1 02	40	34	20	26		1 0															
CAP2 Relationship Building	5 41	92	42	25	20	24		59	1 0														
CAP3 Product Development	5 02	1 10	17	22	20	29		23	24	1 0													
Competitive Strategy (STR)	**5.04**	**.89**									**1.0**				**.26**				**.29**				**.01**
STR1 Cost Leadership	5 29	1 14	15	15	17	18		20	13	22		1 0											
STR2 Marketing Differentiation	4 31	1 35	16	07	11	11		23	18	13		22	1 0										
STR3 Service Differentiation	5 22	1 25	10	19	14	23		22	13	04		39	17	1 0									
Positional Advantage (ADV)	**4.94**	**.72**													**1.0**				**.48**				**–.02**
ADV1 Cost	4 20	1 23	02	13	18	19		14	10	14		03	– 01	09		1 0							
ADV2 Product	5 14	95	18	21	07	19		17	26	23		11	18	08		– 18	1 0						
ADV3 Service	4 98	97	33	34	23	26		26	35	23		20	19	19		– 17	48	1 0					

TABLE 2
Continued

Constructs and Measures	Mean	S.D.	RES1	RES2	RES3	RES4	CAP	CAP1	CAP2	CAP3	STR	STR1	STR2	STR3	ADV	ADV1	ADV2	ADV3	PRF	PRF1	PRF2	PRF3	CIN
Venture Performance (PRF)	**5.14**	**.76**																	**1.0**				**–.11**
PRF1 Economic	4 68	1 19	30	31	19	18		31	35	28		18	14	12		10	17	23		1 0			
PRF2 Distributor	5.39	90	36	35	21	27		41	51	25		20	20	14		08	37	47		34	1 0		
PRF3 End-user	5.08	.86	39	29	20	25		37	39	24		15	17	14		13	31	36		29	66	1 0	
Competitive Intensity (CIN)	**4.26**	**1.21**	02	–01	02	00		–11	–05	–03		05	–03	01		–01	–01	–01		–08	–07	–13	**1.0**

Notes Correlation coefficients greater than 12 are significant at $p <$ 05, and correlations greater than 15 are significant at $p <$ 01 S D = standard deviation

TABLE 3
Structural Model Results

Paths in Theoretical Model	Standardized Coefficient	t-Value	Probability ≤
Available resources → available capabilities	56	6 30	001
Available resources → export venture competitive strategy	25	2 03	021
Available capabilities → export venture competitive strategy	28	2 21	014
Available resources → positional advantage in export market	26	2 69	043
Available capabilities → positional advantage in export market	56	4 63	001
Export venture competitive strategy → positional advantage in export market	12	1 30	097
Positional advantage in export market → export venture performance	87	5 04	001
Export market competitive intensity → positional advantage in export market	03	32	374
Export market competitive intensity → export venture performance	– 11	–1 45	074
Fit Indexes			
$\chi^2_{(111)}$ = 234 56, $p <$ 001			
CFI = 94, NNFI = 93			
RMSEA = 062, AOSR = 056			
Split Group Moderator Test[a]			
Low-Competitive-Intensity Group			
Export venture competitive strategy → positional advantage in export market	43	2 16	019
High-Competitive-Intensity Group			
Export venture competitive strategy → positional advantage in export market	– 01	– 09	540

[a] Groups split at median level of competitive intensity

markets These results support several studies that report that firm-specific resources and capabilities are more important than industry or market characteristics in determining interfirm performance variations (e g , McGahan and Porter 1997, Rumelt 1991)

Implications for Theory Development

Our research has three important implications for marketing theory development in export performance and, more broadly, firm performance First, in linking resource and capability heterogeneity with export venture performance, our research provides empirical support for the RBV explanations of firm performance that have been adopted by an increasing number of marketing researchers (e g., Hunt and Morgan 1995) However, our research also extends traditional RBV explanations by supporting the emerging dynamic capabilities paradigm that links the organizational processes by which firms develop and deploy resources with business performance Distinguishing between the firm's resource endowments and the capabilities with which it develops and deploys its resources as explanations of interfirm performance variations is an important theoretical distinction (Makadok 2001) that is rarely applied in marketing theory Our theoretical model and empirical results indicate that researchers should pay particular attention to delineating and assessing marketing capabilities in order to build on traditional RBV theory approaches to explaining export venture and firm performance

Second, our research has important implications for SCP-based approaches that center on the role of industry/market characteristics and competitive strategy choices in determining firm performance Our findings suggest that the direct effect of competitive intensity on export venture positional advantages and performance is less important than was previously believed, but the indirect effect on positional advantages through strategy implementation is significant This suggests that researchers who draw on SCP theory regarding the effect of industry characteristics should not simply examine the direct effect of structural characteristics (e g , rivalry between players in a market) on firm performance but should also focus on the indirect effect of such industry or market characteristics on firms' ability to implement competitive strategy decisions to achieve positional advantage Our study also indicates that researchers who investigate strategy–performance linkages should not assume that competitive strategy decisions are subsequently realized but should consider the important role of competitive intensity in determining the effective implementation of planned competitive strategy decisions

Third, given the growing importance of understanding the role of marketing in determining firm performance, our research highlights the utility of integrating divergent theoretical perspectives Viewing RBV and SCP perspectives as competing rather than complementary has limited researchers' ability to explain interfirm performance variations Our theoretical model and the substantial proportion of variance in export venture performance accounted for in our empirical study indicate that the two theoretical approaches can be integrated in a way that allows for a more complete explanation of firm performance over time For example, RBV theory identifies relationships between resources and capabilities as contributing to isolating mechanisms that inhibit competitive imitation, such as asset interconnectedness and social complexity (Barney 1991, Bharadwaj, Varadarajan, and Fahy 1993) By specifying relationships between export venture resources and capabilities *and* competitive strategy choices in our integrated theory, the potential for such isolating mechanisms increases even further Thus, although we were unable to empirically assess this prediction with our data, integrating RBV and

SCP theories provides a stronger theoretical rationale for explaining export venture performance over time than either theory would alone.

Implications for Managers and Policymakers

In the past, managers have been offered competing theory prescriptions on how to improve performance. The SCP-based prescriptions lead export venture managers to focus their efforts on formulating and implementing competitive strategies that are appropriate for their export market (e.g., Porter 1980, 1985). The RBV prescriptions lead managers to focus their efforts on acquiring, assessing, and deploying available resources (e.g., Grant 1991). However, our theoretical model and empirical findings indicate that managers should attend to the interrelationships between both types of activity. Specifically, our research indicates that in attempting to enhance export venture performance, managers should focus their efforts on the key areas of resource acquisition and capability building and on matching competitive strategy choices with available resources and capabilities and the needs and requirements of channel partners and customers in the target export market. Our data point to the importance of managers' close monitoring and forecasting of competitors' independent strategy moves and rivals' responses to competitive strategy decisions as key decision-making input that may strengthen the link between competitive strategy decisions and the achievement of positional advantages.

In discussing our results with export venture managers, they requested additional insight into individual positional advantages, resources, and capabilities associated with export venture performance in our data. Sample-size limits precluded a comprehensive structural equation modeling analysis that involved each individual dimension of our higher-order constructs. However, a *post hoc* analysis provides insight into the issue. We split our sample at the median level of export venture performance and examined the levels of individual positional advantages, resources, and capabilities observed in the high- and low-performance group (Table 4). The results indicate that investments in all four types of resources may lead to export venture performance payoffs. Given the nature of experiential and scale resources, the payoffs may increase over time as the level of these resources increases. From a capabilities perspective, significant differences exist between the high- and low-performing export venture groups for all three capabilities we examined. The larger differences in relationship-building and informational capabilities available to export ventures in each group imply that enhancing these capabilities may be a priority area for investment consideration. Finally, in terms of positional advantage, our results indicate that export venture managers (at least in developed countries) might be wise to emphasize strategies that deliver superior service- and product-based positional advantages rather than cost-based advantages.

Given the economic impact of exporting, export performance is also a significant area of interest for policymakers whose major objective is to stimulate sustainable export activity among indigenous firms (Czinkota 2000). Traditional approaches emphasize the provision of foreign market data to help current and potential exporters develop more effective competitive strategies. Our results indicate that policymakers should focus more attention on increasing the resources available to export ventures. Although the provision of direct financial, scale, and physical resources is beyond the scope of most policymakers, our results indicate that experiential resources may be a useful area of focus. Traditional export-trade promotion activities may indirectly aid the development of some aspects of the experiential resources available to export ventures. However, policymakers should also consider ways to directly help firms gain experience in export markets. For example, organizing field-research trips for managers to particular foreign markets may help managers learn from experience, thereby more directly raising levels of available experiential resources. Similarly, creating networks of noncompeting firms that are involved in selling in individual export markets and enabling cross-firm information sharing may also facilitate the development of relevant experiential resources by providing opportunities for firms to learn from one another.

In addition, our study reveals the importance of available capabilities in strengthening export venture performance, which suggests that policymakers should seek to assist firms in acquiring and enhancing relevant capabilities. To aid the development of stronger informational capabilities, rather than just responding to specific export market information requests, appropriate export trade development assistance should also provide training for managers in export market

TABLE 4
Above- Versus Below-Median Performing Export Venture Profiles

Resources, Capabilities, and Positional Advantages	Above-Median Performer Mean (S.D)	Below-Median Performer Mean (S.D.)	t-Value (Probability ≤)
Experiential resources	5.36 (1.30)	4.45 (1.15)	6.27 (.001)
Financial resources	3.84 (1.34)	4.44 (1.48)	3.60 (.001)
Scale resources	4.25 (1.44)	3.44 (1.30)	4.91 (.001)
Physical resources	4.67 (1.01)	4.24 (.78)	4.01 (.001)
Product development capabilities	5.29 (1.07)	4.73 (1.07)	4.47 (.001)
Relationship-building capabilities	5.80 (.79)	5.01 (.88)	7.95 (.001)
Informational capabilities	4.89 (1.06)	4.20 (.86)	6.04 (.001)
Service-based advantage	5.44 (.87)	4.52 (.84)	9.14 (.001)
Product-based advantage	5.45 (.97)	4.81 (.83)	5.92 (.001)
Cost-based advantage	4.27 (1.24)	4.10 (1.21)	1.21 (.227)

Notes: S.D. = standard deviation.

research and analysis Our results also indicate that policymakers should consider ways they can aid the development of firms' relationship-building and product development capabilities For example, design and funding of benchmarking studies to bolster relationship-building and product development capabilities in current and potential exporter firms may be a worthwhile export trade development investment

Limitations and Directions for Further Research

Our research focuses on the antecedents of export venture performance as an area of key managerial and theoretical interest This focus somewhat limits our theory's applicability at the firm level, which requires consideration of the factors that lead firms to select target export markets and to create export ventures Although such choices will be influenced by available resources and capabilities, they are likely to be affected by the characteristics of the various export marketplaces that are open to the firm Further research that examines the internal resource and capability characteristics and external market characteristics that drive export market selection choices would help extend our theory to the firm level In addition, our findings raise the question of the extent to which the sharing of resources and capabilities between export ventures contributes to firm-level export performance[7] In theory, firms that share resources and capabilities across a greater number of export ventures (and other business units in the firm) than competitors should be able to invest to create superior resource and capability stocks (e g , Hamel and Prahalad 1994) Further research that examines resource and capability sharing across export ventures within the firm will allow for further adaptation of our theory, thereby leading to a better understanding of firm-level export performance

The empirical assessment of our theoretical model should be interpreted in light of several limitations resulting from trade-off choices in our research design First, absence of secondary data and logistical constraints in primary data collection required us to assess our theoretical model empirically using cross-sectional data, which precluded assessments of both the investment and learning effects on the resources and capabilities available to export ventures and the sustainability of export venture performance we observed Although longitudinal research designs are time consuming and logistically difficult, they would enable time-series data analysis, which more fully reflects the dynamic relationships in our theoretical model of export venture performance Second, because the use of a single distributor in an export market is the most popular export market entry and sales expansion mode, and to provide greater control over sources of extraneous variance, we focused on export ventures that only use a single distributor To enhance the generalizability of our findings, additional studies should assess our theory in the less common contexts of export ventures that use multiple distributors and ventures that sell direct to export customers

Third, we rely on fieldwork insights to guide the selection of the dimensions we used to indicate each of the higher-order constructs in our theoretical model Further research should examine the extent to which additional and/or different dimensions of each construct enhance understanding of the antecedents of export performance Our focus on developing and testing a general theoretical model and the size of our sample also precluded a detailed examination of the effect of individual-level resources and capabilities and their interrelationships on the competitive strategy, positional advantage, and performance of export ventures Further research that examines the role of individual resources and capabilities, as well as configurations of different resources and capabilities, would provide additional theoretical and managerial insights into the determinants of export venture performance

Beyond these limitations, and our discussion of implications for theory development, an additional direction for further research is the role of competitive intensity in determining strategy implementation Although marketing researchers have long recognized that successful implementation of strategy decisions is key to explaining firm performance (e g , Day and Wensley 1988, Walker and Ruekert 1987), the theoretical and empirical understanding of this issue remains limited Our study indicates that in addition to internal factors, such as organization design (e g , Vorhies and Morgan 2003) and management and employee buy-in (e g , Noble and Mokwa 1999), external factors, such as the abilities and behaviors of marketplace rivals, also have an important effect on strategy implementation success Further research that identifies additional external factors that affect the implementation of strategic decisions and examines the relative importance of different internal and external factors under various conditions would contribute greatly to the understanding of marketing's role in determining export venture and, more broadly, firm performance

Conclusion

Despite the size and importance of exporting and the keen interest of both managers and policymakers, the absence of a general theory that explains export venture performance has resulted in significant gaps in knowledge Viewing performance as a dynamic process, we propose an integrative new theory of the antecedents of export venture performance and provide initial empirical support for many of the predicted relationships Given the increasing importance of export ventures in determining firm and national economic performance, additional studies are needed to promote further understanding of export venture performance With roots in established economics, strategy, and marketing theories, and sufficient scope to incorporate disparate empirical findings into a cohesive body of knowledge, our theoretical model provides a strong foundation for knowledge development in this increasingly important domain of marketing activity

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[7] We thank a reviewer for pointing out the potential impact of this issue on firm-level export performance

APPENDIX A
Constructs, Measurement Items, and Reliability

Construct and Measurement Items	Reliability
Resources Available to Export Ventures	
("Much worse" and "Much better" compared with main competitors are scale anchors)	
A. Experiential	87
EXP1 Knowledge of export venture market	
EXP2 Length of firm's export experience (years)	
EXP3 Number of export ventures in which the firm has been involved	
EXP4 Past venture performance	
B. Scale	86
SCL1 Annual turnover	
SCL2 Number of full-time employees	
SCL3 Percentage of employees mainly involved in the export function	
C. Financial	90
FIN1 Availability of financial resources to be devoted to export activities	
FIN2 Availability of financial resources to be devoted to this export venture	
D. Physical	82
PHY1 Use of modern technology and equipment	
PHY2 Preferential access to valuable sources of supply	
PHY3 Production capacity availability	
Capabilities Available to Export Ventures	
("Much worse" and "Much better" compared with main competitors are scale anchors)	
A. Informational	87
INF1 Identification of prospective customers	
INF2 Capturing important market information	
INF3 Acquiring export market-related information	
INF4 Making contacts in the export market	
INF5 Monitoring competitive products in the export market	
B. Relationship Building	85
REL1 Understanding overseas customer requirements	
REL2 Establishing and maintaining close supplier relationships	
REL3 Establishing and maintaining close overseas distributor relationships	
C. Product Development	84
PRD1 Development of new products for our export customers	
PRD2 Building of the product to designated or revised specifications	
PRD3 Adoption of new methods and ideas in the manufacturing process	
Competitive Strategy	
("No emphasis at all" and "Great emphasis" are scale anchors)	
A. Cost Leadership	71
COS1 Improving production/operating efficiency	
COS2 Maintaining experienced and trained personnel	
COS3 Adopting innovative manufacturing methods and/or technologies	
B. Marketing Differentiation	81
MAR1 Improving/maintaining advertising and promotion	
MAR2 Building brand identification in the export venture market	
MAR3 Adopting new/innovative marketing techniques and methods	
C Service Differentiation	
SERV1 Achieving/maintaining quick product delivery	76
SERV2 Achieving/maintaining prompt response to customer orders	
SERV3 Offering extensive customer service	
Positional Advantage	
("Much worse" and "Much better" compared with main competitors are scale anchors)	
A. Cost	90
ACOS1 Cost of raw materials	
ACOS2 Production cost per unit	
ACOS3 Cost of goods sold	
ACOS4 Selling price to end-user customers	
B. Product	77
APRD1 Product quality	
APRD2 Packaging	
APRD3 Design and style	

APPENDIX A
Continued

Construct and Measurement Items	Reliability
C. Service	76
ASERV1 Product accessibility	
ASERV2 Technical support and after-sales service	
ASERV3 Delivery speed and reliability	
ASERV4 Product line breadth	
Export Venture Performance	
("Much worse" and "Much better" compared with main competitors over past 12 months are scale anchors)	
A. Economic	89
ECON1 Export sales volume	
ECON2 Export market share	
ECON3 Profitability	
ECON4 Percentage of sales revenue derived from products introduced in this market during the past three years	
B. Distributor	87
DIS1 Service quality	
DIS2 Quality of your company's relationship with distributor	
DIS3 Reputation of your company	
DIS4 Distributor loyalty to your company	
DIS5 Overall satisfaction with your total product/service offering	
C. End-user	83
END1 Quality of your company's end-user customer relationships	
END2 Reputation of your company	
END3 End-user customer loyalty to your firm	
END4 End-user customer satisfaction	
Competitive Intensity	81
("Strongly agree" and "Strongly disagree" are scale anchors)	
COMP1 Competition in our export market is cut-throat	
COMP2 There are many promotion wars in our export market	
COMP3 Anything that one competitor can offer others can match easily	
COMP4 Price competition is a hallmark of our export market	
COMP5 One hears of a new competitive move almost every day	

Notes Full references for sources of individual measurement items are available from authors

APPENDIX B
Sample Characteristics

	Mean (S.D.)	Median	Mode	Range
Firm employee size	203 (214)	140	100	28 to 2200
Firm sales revenue	$30M ($81M)	$15M	$15M	$400,000 to $1 2B
Years firm has been engaged in exporting operations	24 (23)	20	20	5 to 198 years
Number of export markets in which the firm operates	28 (26)	20	20	1 to 150
Years of operation of the export venture reported on	9 (8)	6	5	5 to 100 years

Notes S D = standard deviation

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Roland T. Rust, Katherine N. Lemon, & Valarie A. Zeithaml

Return on Marketing: Using Customer Equity to Focus Marketing Strategy

The authors present a unified strategic framework that enables competing marketing strategy options to be traded off on the basis of projected financial return, which is operationalized as the change in a firm's customer equity relative to the incremental expenditure necessary to produce the change The change in the firm's customer equity is the change in its current and future customers' lifetime values, summed across all customers in the industry Each customer's lifetime value results from the frequency of category purchases, average quantity of purchase, and brand-switching patterns combined with the firm's contribution margin The brand-switching matrix can be estimated from either longitudinal panel data or cross-sectional survey data, using a logit choice model Firms can analyze drivers that have the greatest impact, compare the drivers' performance with that of competitors' drivers, and project return on investment from improvements in the drivers To demonstrate how the approach can be implemented in a specific corporate setting and to show the methods used to test and validate the model, the authors illustrate a detailed application of the approach by using data from the airline industry Their framework enables what-if evaluation of marketing return on investment, which can include such criteria as return on quality, return on advertising, return on loyalty programs, and even return on corporate citizenship, given a particular shift in customer perceptions This enables the firm to focus marketing efforts on strategic initiatives that generate the greatest return

The Marketing Strategy Problem

Top managers are constantly faced with the problem of how to trade off competing strategic marketing initiatives For example, should the firm increase advertising, invest in a loyalty program, improve service quality, or none of the above? Such high-level decisions are typically left to the judgment of the chief marketing or chief executive officers, but these executives frequently have little to base their decisions on other than their own experience and intuition A unified, data-driven basis for making broad, strategic marketing trade-offs has not been available In this article, we propose that trade-offs be made on the basis of projected financial impact, and we provide a framework that top managers can use to do this

Financial Accountability

Although techniques exist for evaluating the financial return from particular marketing expenditures (e g , advertising, direct mailings, sales promotion) given a longitudinal history of expenditures (for a review, see Berger et al 2002), the approaches have not produced a practical, high-level model that can be used to trade off marketing strategies in general Furthermore, the requirement of a lengthy history of longitudinal data has made the application of return on investment (ROI) models fairly rare in marketing As a result, top management has too often viewed marketing expenditures as short-term costs rather than long-term investments and as financially unaccountable (Schultz and Gronstedt 1997) Leading marketing companies consider this problem so important that the Marketing Science Institute has established its highest priority for 2002–2004 as "Assessing Marketing Productivity (Return on Marketing) and Marketing Metrics " We propose that firms achieve this financial accountability by considering the effect of strategic marketing expenditures on their customer equity and by relating the improvement in customer equity to the expenditure required to achieve it

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Customer Equity

Although the marketing concept has reflected a customer-centered viewpoint since the 1960s (e.g., Kotler 1967), marketing theory and practice have become increasingly customer-centered during the past 40 years (Vavra 1997, pp. 6–8). For example, marketing has decreased its emphasis on short-term transactions and has increased its focus on long-term customer relationships (e.g., Håkansson 1982; Storbacka 1994). The customer-centered viewpoint is reflected in the concepts and metrics that drive marketing management, including such metrics as customer satisfaction (Oliver 1980), market orientation (Narver and Slater 1990), and customer value (Bolton and Drew 1991). In recent years, customer lifetime value (CLV) and its implications have received increasing attention (Berger and Nasr 1998; Mulhern 1999; Reinartz and Kumar 2000). For example, brand equity, a fundamentally product-centered concept, has been challenged by the customer-centered concept of customer equity (Blattberg and Deighton 1996; Blattberg, Getz and Thomas 2001; Rust, Zeithaml, and Lemon 2000). For the purposes of this article, and largely consistent with Blattberg and Deighton (1996) but also given the possibility of new customers (Hogan, Lemon, and Libai 2002), we define *customer equity* as the total of the discounted lifetime values summed over all of the firm's current and potential customers.[1]

Our definition suggests that customers and customer equity are more central to many firms than brands and brand equity are, though current management practices and metrics do not yet fully reflect this shift. The shift from product-centered thinking to customer-centered thinking implies the need for an accompanying shift from product-based strategy to customer-based strategy (Gale 1994; Kordupleski, Rust, and Zahorik 1993). In other words, a firm's strategic opportunities might be best viewed in terms of the firm's opportunity to improve the drivers of its customer equity.

Contribution of the Article

Because our article incorporates elements from several literature streams within the marketing literature, it is useful to point out the relative contribution of the article. Table 1 shows the contribution of this article with respect to several streams of literature that influenced the return on marketing conceptual framework. Table 1 shows related influential literature streams and exemplars of the stream, and it highlights key features that differentiate the current effort from previous work. For example, strategic portfolio models, as Larreché and Srinivasan (1982) exemplify, consider strategic trade-offs of any potential marketing expenditures. However, the models do not project ROI from specific expenditures, do not model competition, and do not model the behavior of individual customers, their customer-level brand switching, or their lifetime value. Our model adds to the strategic portfolio literature by incorporating those elements.

Three related streams of literature involve CLV models (Berger and Nasr 1998), direct marketing–motivated models of customer equity (e.g., Blattberg and Deighton 1996; Blattberg, Getz, and Thomas 2001), and longitudinal database marketing models (e.g., Bolton, Lemon, and Verhoef 2004; Reinartz and Kumar 2000). Our CLV model builds on these approaches. However, the preceding models are restricted to companies in which a longitudinal customer database exists that contains marketing efforts that target each customer and the associated customer responses. Unless the longitudinal database involves panel data across several competitors, no competitive effects can be modeled. Our model is more general in that it does not require the existence of a longitudinal database, and it can consider any marketing expenditure, not only expenditures that are targeted one-to-one. We also model competition and incorporate purchases from competitors (or brand switching), in contrast to most existing models from the direct marketing tradition.

The financial-impact element of our model is foreshadowed by two related literature streams. The service profit chain (e.g., Heskett et al. 1994; Kamakura et al. 2002) and return on quality (Rust, Zahorik, and Keiningham 1994, 1995) models both involve impact chains that relate service quality to customer retention and profitability. The return on quality models go a step farther and explicitly project financial return from prospective service improvements. Following both literature streams, we also incorporate a chain of effects that leads to financial impact. As does the return on quality model, our model projects ROI. Unlike other models, our model facilitates strategic trade-offs of any prospective marketing expenditures (not only service improvements). We explicitly model the effect of competition—an element that does not appear in the service profit chain or return on quality models. Also different from prior research, our approach models customer utility, brand switching, and lifetime value.

Finally, we compare the current article with a recent book on customer equity (Rust, Zeithaml, and Lemon 2000) that focuses on broad managerial issues related to customer equity, such as building a managerial framework related to value equity, brand equity, and relationship equity. The book includes only one equation (which is inconsistent with the models in this article). Our article is a necessary complement to the book, providing the statistical and implementation details necessary to implement the book's customer equity framework in practice. The current work extends the book's CLV conceptualization in two important ways: It allows for heterogeneous interpurchase times, and it incorporates customer-specific brand-switching matrices. In summary, the current article has incorporated many influences, but it makes a unique contribution to the literature.

Overview of the Article

In the next section, on the basis of a new model of CLV, we describe how marketing actions link to customer equity and financial return. The following section describes issues in the implementation of our framework, including data options, model input, and model estimation. We then present

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[1] For expositional simplicity, we assume throughout much of the article that the firm has one brand and one market, and therefore we use the terms "firm" and "brand" interchangeably. In many firms, the firm's customer equity may result from sales of several brands and/or several distinct goods or services.

TABLE 1
Comparing the Return on Marketing Model with Existing Marketing Models

Type of Model	Exemplars	Strategic Trade-offs of Any Marketing Expenditures	ROI Modeled and Calculated?	Explicitly Models Competition?	Calculation of CLV?	Can Be Applied to Most Industries?	Net Present Value of Revenues and Costs?	Brand Switching Modeled at Customer Level?	Statistical Details?
Strategic portfolio	Larreché and Srinivasan (1982)	Yes	No	No	No	Yes	Yes	No	Yes
CLV	Berger and Nasr (1998)	No	No	No	Yes	No	Yes	No	Yes
Direct marketing customer equity	Blattberg and Deighton (1996), Blattberg, Getz, and Thomas (2001)	No	Yes	No	Yes	Yes	Yes	No	Yes
Longitudinal database marketing	Bolton, Lemon, and Verhoef (2004), Reinartz and Kumar (2000)	Yes	Yes	No, unless panel data	Yes	No	Yes	No, unless panel data	Yes
Service profit chain	Heskett et al (1994), Kamakura et al (2002)	No	No	No	No	No	No	No	Yes
Return on quality	Rust, Zahorik, and Keiningham (1994,1995)	No	Yes	No	No	Yes	Yes	No	Yes
Customer equity book	Rust, Zeithaml, and Lemon (2000)	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Return on marketing	Current paper	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

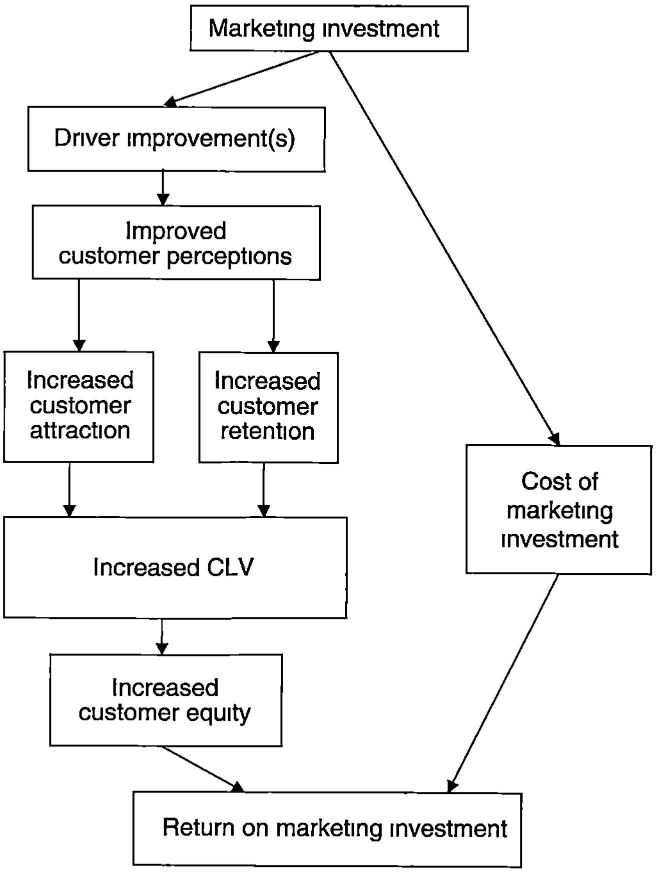
an example application to the airline industry, showing some of the details that arise in application, in testing and validating our choice model, and in providing some substantive observations We end with discussion and conclusions

Linking Marketing Actions to Financial Return

Conceptual Model

Figure 1 shows a broad overview of the conceptual model that we used to evaluate return on marketing Marketing is viewed as an investment (Srivastava, Shervani, and Fahey 1998) that produces an improvement in a driver of customer equity (for simplicity of exposition, we refer to an improvement in only one driver, but our model also accommodates simultaneous improvement in multiple drivers) This leads to improved customer perceptions (Simester et al 2000), which result in increased customer attraction and retention (Danaher and Rust 1996) Better attraction and retention lead to increased CLV (Berger and Nasr 1998) and customer equity (Blattberg and Deighton 1996) The increase in customer equity, when considered in relation to the cost of marketing investment, results in a return on marketing investment Central to our model is a new CLV model that incorporates brand switching

FIGURE 1
Return on Marketing


Marketing investment
Driver improvement(s)
Improved customer perceptions
Increased customer attraction
Increased customer retention
Cost of marketing investment
Increased CLV
Increased customer equity
Return on marketing investment

Brand Switching and CLV

It has long been known that the consideration of competing brands is a central element of brand choice (Guadagni and Little 1983) Therefore, we begin with the assumption that competition has an impact on each customer's purchase decisions, and we explicitly consider the relationship between the focal brand and competitors' brands In contrast, most, if not all, CLV models address the effects of marketing actions without considering competing brands This is because data that are typically available to direct marketers rarely include information about the sales or preference for competing brands Our approach incorporates information about not only the focal brand but competing brands as well, which enables us to create a model that contains both customer attraction and retention in the context of brand switching The approach considers customer flows from one competitor to another, which is analogous to brand-switching models in consumer packaged goods (e g , Massy, Montgomery, and Morrison 1970) and migration models (Dwyer 1997) The advantage of the approach is that competitive effects can be modeled, thereby yielding a fuller and truer accounting of CLV and customer equity

When are customers gone? Customer retention historically has been treated according to two assumptions (Jackson 1985) First, the "lost for good" assumption uses the customer's retention probability (often the retention rate in the customer's segment) as the probability that a firm's customer in one period is still the firm's customer in the following period Because the retention probability is typically less than one, the probability that the customer is retained declines over time The implicit assumption is that customers are "alive" until they "die," after which they are lost for good Models for estimating the number of active customers have been proposed for relationship marketing (Schmittlein, Morrison, and Columbo 1987), customer retention (Bolton 1998), and CLV (Reinartz 1999)

The second assumption is the "always a share" assumption, in which customers may not give any firm all of their business Attempts have been made to model this by a "migration model" (Berger and Nasr 1998, Dwyer 1997) The migration model assigns a retention probability as previously, but if the customer has missed a period, a lower probability is assigned to indicate the possibility that the customer may return Likewise, if the customer has been gone for two periods, an even lower probability is assigned This is an incomplete model of switching because it includes purchases from only one firm

In one scenario (consistent with the lost-for-good assumption) when the customer is gone, he or she is gone This approach systematically understates CLV to the extent that it is possible for customers to return In another scenario (consistent with the migration model), the customer may leave and return In this scenario, customers may be either serially monogamous or polygamous (Dowling and Uncles

1997), and their degrees of loyalty may vary or even change We can model the second (more realistic) scenario using a Markov switching-matrix approach [2]

Acquisition and retention Note that the brand-switching matrix models both the acquisition and the retention of customers Acquisition is modeled by the flows from other firms to the focal firm, and retention is modeled by the diagonal element associated with the focal firm The retention probability for a particular customer is the focal firm's diagonal element, as a proportion of the sum of the probabilities in the focal firm's row of the switching matrix Note that this implies a different retention rate for each customer × firm combination (we show the details of this in a subsequent section) This describes the acquisition of customers who are already in the market In growing markets, it is also important to model the acquisition of customers who are new to the market

The switching matrix and lifetime value We propose a general approach that uses a Markov switching matrix to model customer retention, defection, and possible return Markov matrices have been widely used for many years to model brand-switching behavior (e g , Kalwani and Morrison 1977) and have recently been proposed for modeling customer relationships (Pfeifer and Carraway 2000, Rust, Zeithaml, and Lemon 2000) In such a model, the customer has a probability of being retained by the brand in the subsequent period or purchase occasion This probability is the retention probability, as is already widely used in CLV models The Markov matrix includes retention probabilities for all brands and models the customer's probability of switching from any brand to any other brand [3] This is the feature that permits customers to leave and then return, perhaps repeatedly In general, this "returning" is confused with initial "acquisition" in other customer equity and CLV approaches The Markov matrix is a generalization of the migration model and is expanded to include the perspective of multiple brands

To understand how the switching matrix relates to CLV, consider a simplified example Suppose that a particular customer (whom we call "George") buys once per month, on average, and purchases an average of $20 per purchase in the product category (with a contribution of $10) Suppose that George most recently bought from Brand A Suppose that George's switching matrix is such that 70% of the time he will rebuy Brand A, given that he bought Brand A last time, and 30% of the time he will buy Brand B Suppose that whenever George last bought Brand B he has a 50% chance of buying Brand A the next time and a 50% chance of buying Brand B This is enough information for us to calculate George's lifetime value to both Brand A and Brand B [4]

Consider George's next purchase We know that he most recently bought Brand A, thus, the probability of him purchasing Brand A in the next purchase is 7 and the probability of him purchasing Brand B is 3 To obtain the probabilities for George's next purchase, we simply multiply the vector that comprises the probabilities by the switching matrix The probability of purchasing Brand A becomes $(7 \times 7) + (3 \times 5) = 64$, and the probability of purchasing Brand B becomes $(7 \times 3) + (3 \times 5) = 36$ We can calculate the probabilities of purchase for Brand A and Brand B as many purchases out as we choose by successive multiplication by the switching matrix Multiplying this by the contribution per purchase yields George's expected contribution to each brand for each future purchase Because future purchases are worth less than current ones, we apply a discount factor to the expected contributions The summation of these across all purchase occasions (to infinity or, more likely, to a finite time horizon) yields George's CLV for each firm Note that if there are regular relationship maintenance expenditures, they need to be discounted separately and subtracted from the CLV

The bridge of actionability We assume that the firm can identify expenditure categories, or drivers (e g , advertising awareness, service quality, price, loyalty program) that influence consumer decision making and that compete for marketing resources in the firm We also assume that management wants to trade off the drivers to make decisions about which strategic investments yield the greatest return (Johnson and Gustafsson 2000) The drivers that are projected to yield the highest return receive higher levels of investment Connecting the drivers to customer perceptions is essential to quantify the effects of marketing actions at the individual customer level Therefore, it is necessary to have customer ratings (analogous to customer satisfaction ratings) on the brand's perceived performance on each driver For example, Likert-scale items can be used to measure each competing brand's perceived performance on each driver, perceptions may vary across customers

The firm may also want to assemble its drivers into broader expenditure categories that reflect higher-level resource allocation We refer to these as "strategic investment categories" For example, a firm may combine all its brand-equity expenditures into a brand-equity strategic investment category, with the idea that the brand manager is responsible for drivers such as brand image and brand awareness

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[2] It is also possible to model the share-of-wallet scenario that is common to business-to-business applications by using the concept of fuzzy logic (e g , Varki, Cooil, and Rust 2000, Wedel and Steenkamp 1989, 1991)

[3] The Pfeifer and Carraway (2000) Markov model considers only one brand and does not capture brand switching Its states pertain to recency rather than brand

[4] Actually, George's CLV also depends on word-of-mouth effects (Anderson 1998, Hogan, Lemon, and Libai 2000), because George may make recommendations to others that increase George's value to the firm To the extent that positive word of mouth occurs, our CLV estimates will be too low Similarly, negative word of mouth will make our estimates too high Although these two effects, being of the opposite sign, tend to cancel out to some extent, there will be some unknown degree of bias due to word of mouth However, word-of-mouth effects are notoriously difficult to measure on a practical basis

Modeling the Switching Matrix

Thus, the modeling of CLV requires modeling of the switching matrix for each individual customer Using individual-level data from a cross-sectional sample of customers, combined with purchase (or purchase intention) data, we model each customer's switching matrix and estimate model parameters that enable the modeling of CLV at the individual customer level

The utility model In addition to the individual-specific customer-equity driver ratings, we also include the effect of brand inertia, which has been shown to be a useful predictive factor in multinomial logit choice models (Guadagni and Little 1983) The utility formulation can be conceptualized as

(1) Utility = inertia + impact of drivers

To make this more explicit, U_{ijk} is the utility of brand k to individual i, who most recently purchased brand j The dummy variable $LAST_{ijk}$ is equal to one if j = k and is equal to zero otherwise, X is a row vector of drivers We then model

$$U_{ijk} = \beta_{0k} LAST_{ijk} + \mathbf{X}_{ik} \boldsymbol{\beta}_{1k} + \varepsilon_{ijk}, \quad (2)$$

where β_{0k} is a logit regression coefficient corresponding to inertia, $\boldsymbol{\beta}_{1k}$ is a column vector of logit regression coefficients corresponding to the drivers, and ε_{ijk} is a random error term that is assumed to have an extreme value (double exponential) distribution, as is standard in logit models The β coefficients can be modeled as either homogeneous or heterogeneous[5] For the current exposition, we present the homogeneous coefficient version of the model In a subsequent section, we build and test alternative versions of the model that allow for heterogeneous coefficients The model can also be estimated separately for different market segments

The individual-level utilities result in individual-level switching matrices Essentially, each row of the switching matrix makes a different assumption about the most recent brand purchased, which results in different utilities for each row That is, the first row assumes that the first brand was bought most recently, the second row assumes that the second brand was bought most recently, and so on The utilities in the different rows are different because the effect of inertia (and the effect of any variable that only manifests with repeat purchase) is present only in repeat purchases

Consistent with the multinomial logit model, the probability of choice for individual i is modeled as

(3) P_{ijk^*} = Pr[individual i chooses brand k*, given that brand j was most recently chosen] = $\exp(U_{ijk^*}) / \sum_k \exp(U_{ijk})$

Thus, the individual-level utilities result in individual-level switching matrices, which result in an individual-level CLV

Brand switching and customer equity To make the CLV calculation more specific, each customer i has an associated J × J switching matrix, where J is the number of brands, with switching probabilities p_{ijk}, indicating the probability that customer i will choose brand k in the next purchase, conditional on having purchased brand j in the most recent purchase The Markov switching matrix is denoted as $\mathbf{M}_i$, and the 1 × J row vector $\mathbf{A}_i$ has as its elements the probabilities of purchase for customer i's current transaction (If longitudinal data are used, the $\mathbf{A}_i$ vector will include a one for the brand next purchased and a zero for the other brands)

For brand j, d_j represents firm j's discount rate, f_i is customer i's average purchase rate per unit time (e g , three purchases per year), v_{ijt} is customer i's expected purchase volume in a purchase of brand j in purchase t,[6] π_{ijt} is the expected contribution margin per unit of firm j from customer i in purchase t, and $\mathbf{B}_{it}$ is a 1 × J row vector with elements B_{ijt} as the probability that customer i buys brand j in purchase t The probability that customer i buys brand j in purchase t is calculated by multiplying by the Markov matrix t times

$$\mathbf{B}_{it} = \mathbf{A}_i \mathbf{M}_i^t \quad (4)$$

The lifetime value, CLV_{ij}, of customer i to brand j is

$$CLV_{ij} = \sum_{t=0}^{T_{ij}} (1 + d_j)^{-t/f_i} v_{ijt} \pi_{ijt} B_{ijt}, \quad (5)$$

where T_{ij} is the number of purchases customer i is expected to make before firm j's time horizon, H_j (e g , a typical time horizon ranges from three to five years), and B_{ijt} is a firm-specific element of $\mathbf{B}_{it}$ Therefore, $T_i = \text{int}[H_j f_i]$, where int[ ] refers to the integer part, and firm j's customer equity, CE_j, can be estimated as

$$CE_j = \text{mean}_i(CLV_{ij}) \times POP, \quad (6)$$

where $\text{mean}_i(CLV_{ij})$ is the average lifetime value for firm j's customers i across the sample, and POP is the total number of customers in the market across all brands Note that the CLV of each individual customer in the sample is calculated separately, before the average is taken

It is worth pointing out the subtle difference between Equation 5 and most lifetime value expressions, as in direct marketing Previous lifetime value equations have summed over time period, and the exponent on the discounting factor becomes –t However, in our case, we are dealing with distinct individuals with distinct interpurchase times (or equivalently, purchase frequencies f_i) For this reason, we sum over purchase instead of time period[7] The exponent $-t/f_i$ reflects that more discounting is appropriate for purchase t if purchasing is infrequent, because purchase t will occur further into the future If $f_i = 1$ (one purchase per period), it is clear that Equation 5 is equivalent to the standard CLV expression If $f_i > 1$, the discounting per purchase becomes less than the discounting per period, to an extent that exactly equals the correct discounting per period For example, for $f_i = 2$, the square root of the period's discounting occurs at each purchase[8]

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[5] To the extent that heterogeneity in the regression coefficients exists, the state dependence effect will likely be overestimated (Degeratu 1999, Frank 1962) This would result in underestimation of the effects of the customer equity drivers, which means that the effect of violation of this assumption would be to make the projections of the model more conservative However, it has been shown that our approach to estimating the inertia effect performs better than other methods that have been proposed (Degeratu 2001)

[6] To simplify the mathematics, we adopt the assumption that a customer's volume per purchase is exogenous We leave the modeling of volume per purchase as a function of marketing effort as a topic for further research

We can also use the customer equity framework to derive an overall measure of the company's competitive standing Market share, historically used as a measure of a company's overall competitive standing, can be misleading because it considers only current sales A company that has built the foundation for strong future profits is in better competitive position than a company that is sacrificing future profits for current sales, even if the two companies' current market shares are identical With this in mind, we define *customer equity share* (CES, in Equation 7) as an alternative to market share that takes CLV into account We calculate customer equity share for each brand j as

$$(7) \qquad CES_j = CE_j / \sum_k CE_k$$

ROI

Effect of changes Ultimately, a firm wants to know the financial impact that will result from various marketing actions This knowledge is essential if competing marketing initiatives are to be evaluated on an even footing A firm may attempt to improve its customer equity by making improvements in the drivers, or it may drill down further to improve subdrivers that influence the drivers (e g , improving dimensions of ad awareness) This requires the measurement of customer perceptions of the subdrivers about which the firm wanted to know more

A shift in a driver (e g , increased ad awareness) produces an estimated shift in utility, which in turn produces an estimated shift in the conditional probabilities of choice (conditional on last brand purchased) and results in a revised Markov switching matrix In turn, this results in an improved CLV (Equations 4 and 5) Summed across all customers, this results in improved customer equity (Equation 6) We assume an equal shift (e g , 1 rating points) for all customers, but this assumption can be relaxed if appropriate, because our underlying modeling framework does not require a constant shift across customers

Projecting financial impact It is often possible to devote a strategic expenditure to improve a driver, but is that investment likely to be profitable? Modern thinking in finance suggests that improved expenditures should be treated as capital investments and viewed as profitable only if the ROI exceeds the cost of capital Financial approaches based on this idea are known by such names as "economic value-added" (Ehrbar 1998) or "value-based management" (Copeland, Koller, and Murrin 1996) The increased interest in economic value-added approaches has attracted more attention to ROI approaches in marketing (Fellman 1999)

The discounted expenditure stream is denoted as E, discounted by the cost of capital, and ΔCE is the improvement in customer equity that the expenditures produce Then, ROI is calculated as

$$(8) \qquad ROI = (\Delta CE - E)/E$$

Operationally, the calculation can be accomplished by using a spreadsheet program or a dedicated software package Note, though, that even if ΔCE is negative, the ROI expression still holds

Implementation Issues

Cross-Sectional Versus Longitudinal Data

Our approach requires the collection of cross-sectional survey data, the approach is similar in style and length to that of a customer satisfaction survey The survey collects customer ratings of each competing brand on each driver Other necessary customer information can be obtained either from the same survey or from longitudinal panel data, if it is available The additional information collected about each customer includes the brand purchased most recently, average purchase frequency, and average volume per purchase The logit model can be calibrated in two ways (1) by observing the next purchase (from either the panel data or a follow-up survey) or (2) by using purchase intent as a proxy for the probability of each brand being chosen in the next purchase

Obtaining the Model Input

The implementation of our approach begins with manager interviews and exploratory research to obtain information about the market in which the firm competes and information about the corporate environment in which strategic decisions are made From interviews with managers, we identified competing firms and customer segments, chose drivers that correspond to current or potential management initiatives, and obtained the size of the market (total number of customers across all brands) and internal financial information, such as the discount rate and relevant time horizon In addition, we estimated contribution margins for all competitors If there was a predictable trend in gross margins for any firm in the industry, we also elicited that trend From exploratory research, using both secondary sources and focus group interviews, we identified additional drivers, which we reviewed with management to ensure that they were managerially actionable items On the basis of the combined judgment of management and the researchers, we reduced the set of drivers to a number that allows for a survey of reasonable length The drivers employed typically vary by industry

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[7] If standard marketing costs (e g , retention promotional costs) are spent on a time basis (e g , every three months), they may either be discounted separately and subtracted from the net present value or be assigned to particular purchases (e g , if interpurchase time is three months, and a standard mailing goes out every six months, the mailing cost could be subtracted on every other purchase)

[8] We should also note that the expression implies that the first purchase occurs immediately Other assumptions are also possible

Estimating Shifts in Customer Ratings

The calculation of ROI requires an estimate of the rating shift that will be produced by a particular marketing expenditure For example, a firm may estimate that an advertising campaign will increase the ad awareness rating by 3 on a five-point scale These estimates can be obtained in several ways If historical experience with similar expenditures is available, that experience can be used to approximate the ratings shift For example, many marketing consulting firms have developed a knowledge base of the effects of marketing programs on measurable indexes Another way, analogous to the decision calculus approach (Blattberg and Deighton 1996, Little 1970), is to have the manager supply a judgment-based estimate The manager may reflect uncertainty by supplying an optimistic and a pessimistic estimate If the outcome was favorable for the optimistic estimate, but unfavorable for the pessimistic estimate, the outcome would be considered sensitive to the rating shift estimate, indicating the need for more information gathering Another limited cost approach is to use simulated test markets (Clancy, Shulman, and Wolf 1994, Urban et al 1997) to obtain a preliminary idea of market response Finally, the marketing expenditure can be implemented on a limited basis, using actual test markets, and the observed rating shift can be monitored (e g , Rust et al 1999, Simester et al 2000)

Calibrating the Data

It is typical in many sampling plans to have respondents with different sampling weights, w_i, correcting for variations in the probability of selection We can use the sampling weights directly, in the usual way, to generate a sample-based estimate of market share, which we denote as MS_{sample} If the sample is truly representative, MS_{sample} should be equal to the actual market share, MS_{true} To make the sample more representative of actual purchase patterns, we can assign a new weight, $w_{i,new} = (MS_{true}/MS_{sample}) \times w_i$ to each respondent, with market shares corresponding to that respondent's most recently chosen brand, which will correct for any sampling bias with respect to any brand The implied market share from the sample will then equal the actual market share

If purchase intent rather than actual purchase data is used, the application must be done with some care Previous researchers have long noted that purchase-intention subjective probabilities occasionally may be systematically biased (Lee, Hu, and Toh 2000, Pessemier et al 1971, Silk and Urban 1978) We assume that the elicited purchase intentions, p_{ij}, of respondent i purchasing brand j in the next purchase need to be calibrated In general, we assume that there is a calibrated probability, p^*_{ij}, that captures the true probability of the next purchase These probabilities can be calibrated in two possible ways First, if it is possible to follow up with each respondent to check on the next purchase, we can find a multiplier K_j for each brand that best predicts choice (We set K_j for the first brand arbitrarily to one, without loss of generality, to allow for uniqueness) The K's can be quickly found using a numerical search If p^*_{ij} is the stated probability of respondent i choosing brand j in the next purchase, the calibrated choice probability is $p^*_{ij} = K_j p_{ij}/\Sigma_k K_k p_{ik}$ Second, if checking the next purchase is not possible, it is still possible to calibrate the purchase intentions by making an approximating assumption Assuming that the market share (as the percentage of customers who prefer a brand) for each brand in the near future (including each respondent's next purchase) is roughly constant, we employ a numerical search to find the K_j's (again setting $K_1 = 1$) for which $MS_{true} = \text{mean}_i(p^*_{ij})$

Model Estimation

Principal components regression In this application, as in customer satisfaction measurement, multicollinearity is an issue that needs to be addressed (Peterson and Wilson 1992) For this reason, we adopt an estimation approach that addresses the multicollinearity issue Principal components regression (Massy 1965) is an approach that combats multicollinearity reasonably well (Frank and Friedman 1993), yet it can be implemented with standard statistical software Principal components regression is a two-stage procedure that is widely known and applied in statistics, econometrics, and marketing (e g , Freund and Wilson 1998, Hocking 1996, Naik, Hagerty, and Tsai 2000, Press 1982) Principal components multinomial logit regression has been used successfully in the marketing literature, leading to greater analysis interpretability and coefficient stability (e g , Gessner et al 1988)

The idea is to reduce the dimensionality of the independent variables by extracting fewer principal components that explain a large percentage of the variation in the predictors The principal components are then used as independent variables in the regression analysis Because the principal components are orthogonal, there is no multicollinearity issue with respect to their effects In addition, eliminating the smallest principal components, which may be essentially random, may reduce the noise in the estimation Because the principal components can be expressed as a linear combination of the independent variables (and vice versa), the coefficients of the independent variables can be estimated as a function of the coefficients of the principal components, and the coefficients (after the least important principal components are discarded) may result in better estimates of the drivers' effects Estimation details are provided in Appendix A

Importance of customer equity drivers The results from the model estimation in Equation 2 provide insight into which customer equity drivers are most critical in the industry in which the firm competes When examining a specific industry, it is useful to know what the key success factors are in that industry Ordinarily, this might be explored by calculating market share elasticities for each driver However, that approach is not correct here, because the drivers are intervally scaled rather than ratio scaled This means that it is incorrect to calculate percentages of the drivers, as is necessary in the calculation of elasticities Moreover, our focus is customer equity rather than market share To arrive at the impact of a driver on customer equity, we need to determine the partial derivative of choice probability, with respect to the driver, for each customer in the sample That is, if a driver were improved by a particular amount, what would be the impact on customer choice and, ultimately, on CLV and customer equity? Appendix A provides details of these computations and significance tests for the drivers

An Example Application

Data and Sampling

Survey items We illustrate our approach with data collected from customers of five industries We assume three strategic investment categories (1) perceived value (Parasuraman 1997, Zeithaml 1988), (2) brand equity (Aaker and Keller 1990), and (3) relationship management (Anderson and Narus 1990, Gummeson 1999) The three categories span all major marketing expenditures (Rust, Zeithaml, and Lemon 2000) We drew heavily on the relevant academic and managerial literature in these areas to build our list of drivers and ensured that the drivers could be translated into actionable expenditures The resulting survey contained questions pertaining to shopping behavior and customer ratings of each driver for the four or five leading brands in the markets we studied In addition, several demographics questions were asked at the end of the survey We selected industries (airlines, electronics stores, facial tissues, grocery, and rental cars) that represented a broad set of consumer goods and services To save space, we present the details for the airline industry analysis only, however, our approach was similar across the other four industries The complete list of the survey items used in our analysis of the airline industry appears in Appendix B

Population We obtained illustrative data from two communities in the northeastern United States an affluent small town/suburb and a medium-sized city that adjoins a larger city Respondents were real consumers who had purchased the product or service in the industry in question during the previous year Demographic statistics suggest that the sample is representative of similar standard metropolitan statistical areas in the United States, with the exception of generally high levels of education and income For example, in the small town (with a population of approximately 20,000), the average age of the respondent was 47, the average household had two adults and one child, the average household income was $91,000, and the average years of education was 17 In the larger city, the average age was somewhat lower (39 years), the average household had two adults and one child, the average household income was $70,000, and the average years of education was similar to that of the small town

Sampling We obtained respondents from three random samples The first sample, drawn from the city population, answered questions about electronics stores and rental car companies The second sample, also drawn from the city population, addressed groceries and facial tissues The third sample, drawn from the small town, focused on airlines Potential respondents were contacted at random by recruiters from a professional market research organization (by telephone solicitation or building intercept) The screening process consisted of two criteria (1) the respondent had purchased from the industry in the past 12 months, and (2) the respondent had a household income of at least $20,000 per year Respondents agreed to participate and received $20 compensation for completing the questionnaire In the electronics stores and rental cars survey, 246 consumers were approached 153 were eligible, 144 cooperated, and 7 were disqualified, resulting in a total of 137 total surveys completed In the groceries and facial tissues survey, 177 consumers were approached 124 were eligible, 122 cooperated, and 4 were disqualified, resulting in a total of 118 surveys completed In the airline survey, 229 consumers were approached 119 were eligible, 105 cooperated, and 5 were disqualified, resulting in a total of 100 surveys completed

Data collection and preliminary analysis Data were collected in December 1998 and January 1999 at the firm's offices in each location The respondents came to the facility to complete the pencil-and-paper questionnaire, which took about 30 minutes They were then thanked for their participation and compensated In addition, we obtained aggregate statistics on the small town and city (e g , percentage of population that uses rental cars, average spent at grocery store) from secondary sources and used them in subsequent analysis For purposes of financial analysis, we used local population and aggregate usage statistics for predominantly local industries (electronics stores and groceries) and national statistics for predominantly national industries (airlines, facial tissues, and rental cars) Although our random samples may not be fully representative of U S users, we extrapolated to the national market for national industries to show the type of dollar magnitudes that can arise given a large population Because our examples are illustrative, truly precise dollar estimates are unnecessary

Data were cleaned to eliminate obvious bad cases and extreme outliers Because listwise deletion of cases would have resulted in too many cases being removed (even though only a relatively small percentage of responses were missing for particular items), we employed mean substitution as our missing data option for all subsequent analyses[9] Because we suspected that the relationship drivers would affect primarily repeat purchasers, we collected relationship items only for the brand most recently purchased[10] We mean-centered the relationship-related drivers for the cases in which the brand considered was the previously purchased brand, and we set them equal to zero for the cases in which the brand considered was different from the previously purchased brand This enabled the "pure" inertia effect to be separated from the relationship effect of the drivers

Choice Model Results

Principal components analysis results We reduced the dimensionality of the predictor variables in each industry by conducting a principal components analysis We used an eigenvalue cutoff of 5, which we judged to provide the best trade-off between parsimony and managerial usefulness[11] The airline analysis began with 17 independent variables, and we retained 11 orthogonal factors Table 2 shows the loadings on the rotated factors The resulting factor structure is rich All the factors are easily interpretable The few negative loadings are small and insignificant, they are zero for all practical purposes All drivers load on only one factor, and many (e g , inertia, quality, price, convenience, trust, corporate citizenship) load on their own unique factor

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[9] Mean substitution can result in biased estimates, but in our judgment, the additional effort of employing a more sophisticated missing values procedure (e g , data imputation) was not justified in this case, given the relatively low percentage of missing values

[10] This decision was based solely on the researchers' best judgment Our model does not require this

There is some degree of discrimination among the value, brand, and relationship strategic investment categories in that drivers in the three strategic action categories of different drivers do not correlate highly on the same factors As we expected, the strategic investment categories, value, brand, and relationship are not unidimensional The drivers that constitute the categories can be grouped for managerial purposes as managers consider them, but drivers in a particular strategic investment category may be quite distinct in the customer's mind

Logit regression results Using the resulting factors as independent variables, we conducted multinomial logit analyses, using the analysis we described previously Table 3 shows the coefficients that arise from the multinomial logit regression analysis, highlighting the significant factors Using Equations A1–A9, we converted the factor-level results to the individual drivers The resulting coefficients, standard errors, and test statistics are shown in Table 4 All the drivers are significant and have the correct sign, but some drivers have a larger effect than others The most important drivers span all three strategic investment categories In addition to the drivers, inertia has a large, significant impact (849, $p <$ 01) Among the value-related drivers, convenience has the largest coefficient (609), followed by quality (441), for brand-related drivers, direct mail information has the largest impact (638), followed by ad awareness (421) and ethical standards (421) The loyalty program (295) and preferential treatment (280) are the most important relationship-related drivers

Model Testing and Validation

We tested and validated the core choice model in several different ways We tested for brand-specific effects, heterogeneity of response, a more general covariance matrix, and the reliability of the coefficient estimates

Brand-specific effects The model in Equation 2 assumes that there are no brand-specific effects We tested the validity of this assumption by including brand-specific constants in the model of Equation 2 Testing the significance of the more complicated model can be accomplished through the use of a nested-likelihood-ratio chi-square test (in the airline application, this involves three degrees of freedom, reflecting a number of brand-specific constants that is equal to the number of brands minus one) The resulting nested model comparison was not significant (χ^2_3 = 977), from which we conclude that brand-specific constants are not required[12]

Heterogeneity of response It is reasonable to suspect that there may be unobserved heterogeneity of response

TABLE 2
Factor Loadings: Airline Industry

Driver	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Inertia	– 013	– 004	033	038	015	116	– 024	**984**	029	043	002
Quality	097	058	174	076	147	212	014	049	068	**904**	083
Price	044	– 007	128	054	078	023	039	030	**975**	.059	034
Convenience	078	068	219	161	043	**830**	.066	163	018	260	– 015
Ad awareness	– 031	130	038	**938**	– 010	022	048	– 011	074	101	058
Information	216	– 077	248	**656**	322	299	– 207	125	– 038	– 058	016
Corporate citizenship	011	122	150	093	**880**	.001	256	021	077	137	006
Community events	021	100	188	– 042	226	051	**921**	– 026	041	011	029
Ethical standards	– 016	044	**605**	.105	458	266	028	– 034	104	109	218
Image fits my personality	098	112	**878**	.107	069	092	203	058	110	142	081
Investment in loyalty program	**921**	.044	090	032	– 007	– 060	018	014	– 003	137	– 103
Preferential treatment	**898**	.087	082	– 002	022	– 071	– 029	032	– 007	077	104
Know airline's procedures	**708**	.232	– 022	116	029	166	058	– 033	010	– 069	240
Airline knows me	**681**	.309	– 073	– 059	– 001	356	– 012	– 061	136	– 075	219
Recognizes me as special	214	**851**	.069	077	– 036	042	138	– 004	– 044	118	092
Community	175	**876**	.065	031	166	035	– 015	001	036	– 042	129
Trust	246	227	179	069	041	– 003	031	006	038	091	**889**

Notes Loadings greater than 5 are shown in bold

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[11] The 1 0 eigenvalue cutoff (Kaiser 1960) is typically employed in marketing, but it is just one of many possible cutoff criteria (for two alternatives, see Cattell 1966, Jolliffe 1972) As Kaiser (1960, p 143), who proposed the 1 0 cutoff, points out, "by far [the] most important viewpoint for choosing the number of factors [is] psychological meaningfulness " In other words, the cutoff should be chosen such that the results are substantively meaningful, which is our justification for using the particular cutoff level that we chose

[12] This nested chi-square was also insignificant in the other four industries that we studied (electronics = 6 79, facial tissues = 1 00, grocery = 5 82, and rental cars = 28)

TABLE 3
Logit Regression Results: Airline Industry

Independent Variable	Coefficient	Standard Error	b/s.e.	*p*
F1	325**	122	2 65	008
F2	– 031	118	– 26	795
F3	421*	210	2 00	045
F4	459	285	1 61	107
F5	212	228	93	352
F6	331*	159	2 08	037
F7	– 081	279	– 29	771
F8	633**	100	6 36	000
F9	034	164	21	835
F10	184	147	1 26	209
F11	– 033	115	– 29	772

Log-likelihood = –98 46
Chi-square (11 degrees of freedom) = 69 246**

*p < 05
**p < 01

TABLE 4
Driver Coefficients: Airline Industry

Driver	Coefficient	Standard Error	b/s.e.
Inertia	849	075	11 341*
Quality	441	041	10 871*
Price	199	020	9 858*
Convenience	609	093	6 553*
Ad awareness	421	099	4 242*
Information	638	082	7 819*
Corporate citizenship	340	045	7 617*
Community events	170	024	6 974*
Ethical standards	421	053	7 901*
Image fits my personality	390	050	7 874*
Investment in loyalty program	295	027	10 956*
Preferential treatment	280	026	10 857*
Know airline's procedures	238	027	8 779*
Airline knows me	249	041	6 108*
Recognizes me as special	167	017	9 771*
Community	151	016	9 412*
Trust	203	023	8 725*

*p < 01

across the respondents That is, expressed in terms of Equation 2, the βs may be different across respondents To test this, we employed a random coefficients logit model (Chintagunta, Jain, and Vilcassim 1991) in which we permitted the driver coefficients to be distributed as an independent multivariate normal distribution The log-likelihood improved from –97 58 to –93 24, which is an insignificant improvement (χ^2_{11} = 8 68) Therefore, we conclude that the random coefficients logit formulation does not produce a better model and that it is not worthwhile in this case to model unobserved heterogeneity in the parameters

Correlated errors Another way the independence from irrelevant alternatives property can be violated is if the error terms in Equation 2 are correlated For example, it is possible that people who prefer American Airlines more than the model predicted will systematically dislike Southwest Airlines more than the model predicted To address this issue, we turned to a multinomial probit model (Chintagunta 1992) In this model, the error terms in Equation 2 are assumed to be normally distributed rather than extreme value, and they are permitted to have a general covariance matrix

Our original logit model is no longer a constrained version of the more complicated model, so we cannot do the nested likelihood-ratio chi-square test However, by comparing the general multinomial probit model with a multinomial probit model in which the error terms are assumed to be independent, we can address the issue of whether modeling the more general covariance matrix is useful This results in a nested test We found that the uncorrelated errors version of the model resulted in a log-likelihood of –98 46 (slightly worse than the multinomial logit log-likelihood) and that the more general model produced a log-likelihood of –97 57 The improvement is insignificant ($\chi_3^2 = 82$) We also can compare the general multinomial probit model with the original multinomial logit model by using the Akaike information criterion The improvement from –97 58 to –97 57 does not compensate for the additional three estimated parameters (we would need a log-likelihood improvement of at least 3 0), suggesting that the general multinomial probit model is not better than our multinomial logit model Thus, we conclude that the more general covariance matrix is not warranted

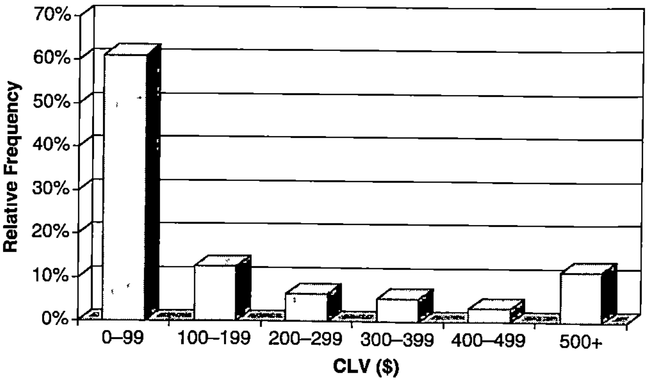
Coefficient reliability Given our relatively small sample size (96 usable data points after the data are cleaned), we were unable to pursue split-half tests or complete holdout samples However, to further understand the reliability of our model estimates, we randomly split our sample into three parts (A, B, and C) and estimated our model on AB, AC, and BC The mean range (and median range) of the coefficient estimates across the 11 factors was 14, that is, on average, the swing between the largest and smallest coefficient estimate across the three samples was 14, which comes out to about 6 standard errors, on average Thus, the model appears to produce reasonably stable coefficient estimates

CLV

Using Equation 5, we calculated CLV for American Airlines for each respondent in our airline sample To operationalize the equation, we assumed a time horizon of three years, a discount rate of 10%, and a contribution margin of 15% The 15% figure was approximately equal to the average operating margin for the industry for the five years preceding the survey, according to annual reports of the four firms we studied (since our study, airline industry operating margins have declined) We also based our contribution margin figures in the other four industries on financial data from annual reports To extend the CLV figures to the firm's U S customer equity, we used U S Census data to determine the number of adults in the United States (187,747,000), and we then combined this with the percentage of U S adults who were active users of airline travel (23 3%), yielding a total number of U S adult airline customers of 43,745,051 To approximate the total customer equity, we multiplied this number by the average CLV across our respondents Note that though we used average CLV to project customer equity, we calculated CLV at the individual customer level for each customer in the sample

Customer loyalty and CLV Some insights can be obtained from examining American Airlines' CLV distribution For example, Figure 2 shows the distribution of CLV across American Airlines' customers The $0–$99 category includes more than 60% of American's customers, and the $500-plus category includes only 11 6% of customers, indicating that the bulk of American's customers have low CLV Figure 3 also indicates that American's customers are fickle Almost half of American's customers have a 20% or less share-of-wallet (by CLV) allocated to American Only 10 5% give more than 80% of their CLV to American This percentage shows dramatically that the vast majority of American's customers cannot be considered monogamously loyal Figure 4 shows a startling picture of the percentage of American's customer equity that is contributed by each CLV category The $0–$99 category, though by far the largest (more than 60% of American's customers), produces less than 10% of American's customer equity In contrast, the $500-plus CLV category, though only 11 6% of American's customers, produces approximately 50% of American's customer equity

FIGURE 2
Distribution of CLV: American Airlines



Comparison with the lost-for-good CLV model Previously, we proposed that some models of CLV that do not account for customers' returning systematically underesti-

FIGURE 3
Distribution of CLV Share (Share of Wallet): American Airlines

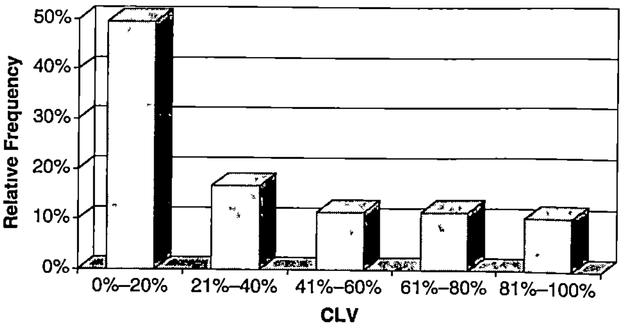
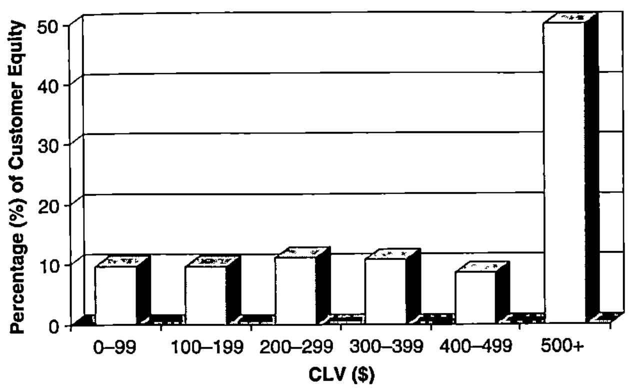


FIGURE 4
Percentage Customer Equity by CLV Category: American Airlines



mate CLV and customer equity (for an exception, see Dwyer 1997) Using the airline sample, we explored the degree to which this was true The lost-for-good model is simply a constrained version of our switching model, such that all probabilities of switching from another brand to the focal brand are zero In other words, to calculate the results, we considered only the customers who were retained from the first purchase When the customer chose another brand, we gave a probability of zero to any further purchase from the focal brand For American Airlines, our brand-switching model gives a customer equity of $7 303 billion Without accounting for switching back, the estimated customer equity declines to $3 849 billion Thus, the lost-for-good model provides a systematic underestimation of customer equity that, in this case, is an underestimation of 47 3%

Customer equity and the value of the firm It has been suggested (Gupta, Lehmann, and Stuart 2001) that customer equity is a reasonable proxy for the value of the firm Our analysis of American Airlines provides some support for this idea Multiplication of American's average CLV ($166 94) by the number of U S airline passengers (43,745,051) yields a total customer equity for American of $7 3 billion Given American's opening share price for 1999 ($60) and its number of shares outstanding at that time (161,300,000) (AMR Corporation 1999), we calculate a market capitalization of $9 7 billion Because our projection ignores profits from international customers and nonflight sources of income, our customer equity calculation is largely compatible with American's market capitalization at the time of the survey

Projected Financial Return

Our framework enables the financial impact of improvement efforts to be analyzed for any of the usual marketing expenditures For example, American Airlines recently spent a reported $70 million to upgrade the quality of its passenger compartments in coach class by adding more leg room Is such an investment justified? To perform an analysis such as this, we estimated the amount of ratings shift and the costs incurred in effecting the ratings shift We then used the ratings shift to alter (for each respondent) the focal brand's utility, switching matrix, and CLV (see Equations 2–5), which, when averaged across respondents and projected to the size of the population (see Equation 6), resulted in a revised estimate for the firm's customer equity In this way, and using the discount rate and contribution margin we discussed previously, we analyzed the recent American Airlines seating improvement We used the $70 million cost figure reported by the company

If we assume that the average for the item that measures quality of the passenger compartment (a subdriver of quality) increases by 2 rating points on the five-point scale, our analysis (see Table 5) indicates that customer equity will improve by 1 39%, resulting in an improvement in customer equity of $101 3 million nationally, or an ROI of 44 7%, which indicates that the program has the potential to be a large success Table 5 shows the results of similar analyses from the other four industries For example, a $45 million expenditure by Puffs facial tissues to improve ad awareness

TABLE 5
Projected ROI from Marketing Expenditures

Company (Industry)	Area of Expenditure	Geographic Region	Investment	Amount Improved	Percentage Improvement in Customer Equity	Dollar Improvement in Customer Equity	Projected ROI
American (airlines)	Passenger compartment	United States	$70 million	2 rating point	1 39%	$101 3 million	44 7%
Puffs (facial tissues)	Advertising	United States	$45 million	3 rating point	7 04%	$58 1 million	29 1%
Delta (airlines)	Corporate ethics	United States	$50 million	1 rating point	1 68%	$85 5 million	71 0%
Bread & Circus (groceries)	Loyalty programs	Local market	$100,000	5 rating point in two measures	7 04%	$87,540	–12 5%

by 3 rating points would result in a $58 1 million improvement in customer equity and an ROI of 29 1% [13]

It is even possible to measure the financial impact of corporate ethical standards or corporate citizenship For example, if Delta spent $50 million to improve customers' perceptions of Delta's ethical standards by 1 rating points, this would project to a customer equity improvement of $85 5 million (a 1 68% increase) Such findings may cause some airlines to reconsider practices such as canceling flights that are not full in order to be profitable

Not all investments will project to be profitable For example, suppose that the grocery store Bread & Circus decides to spend $100,000 in the local retail area to improve its loyalty program ratings across two measures by 5 points The projected benefit is not enough to justify the expenditure, and the ROI is –12 5%

The preceding examples illustrate only some of the marketing expenditures that can be evaluated by means of the customer equity framework Any marketing expenditure can be related to the drivers of customer equity, measured, and evaluated financially This capability enables a firm to screen improvement ideas either before application or after a test market has nailed down the expected degree of improvement

Model Sensitivity

The preceding analyses are based on point estimates, but how sensitive is the ROI model to errors of estimation or measurement? Sensitivity to errors of estimation can be analyzed by considering the sampling distribution of β_x Appendix A shows how to construct confidence intervals for β_x Then, by applying the end points of the confidence interval to the ROI model, it is possible to analyze the sensitivity of ROI to estimation error In general, this error is of more concern on the low side, because overoptimism may result in inappropriate expenditures With this in mind, we suggest calculation of a coefficient, $\beta_{\bar{x}}$, which will be greater than the true value only 5% of the time Assuming that there is a large n, this is calculated as

$$(9) \qquad \beta_{\bar{x}} = \beta_x - 1\ 645(\text{standard error of } \beta_x)$$

Then, $\beta_{\bar{x}}$ can be used to produce "conservative" projections of the customer equity change and the ROI This can be done by inserting $\beta_{\bar{x}}$ directly into the customer equity calculations For example, if we calculate a conservative estimate of customer equity impact for the American Airlines example in Table 5, we obtain a $93 9 million increase in customer equity, or a 1 29% increase This would result in a 34 2% ROI, indicating that even a conservative estimate shows a quite favorable return

Sensitivity to errors of measurement can be addressed by considering the sampling distribution of the sample mean In Equation A5 in Appendix A, unlike the case in regression analysis, the level of a variable affects the extent to which a change in the variable affects choice and thus utility, CLV, and customer equity By evaluating the end points of the confidence interval for the sample mean of a variable to be improved, we can thus obtain a confidence interval for the ROI that will result from a shift in that variable We performed this analysis for the Delta Airlines corporate ethics example in Table 5 A 95% confidence interval for the mean on the corporate ethics variable was 3 346 ± 188, which results in a 95% confidence interval for corporate ethics improvement of $83 1 million/$87 8 million and a 95% confidence interval for ROI of 66%/76%

If the projected rating shift results from a test market, the sampling distribution of the rating shift can also be employed to generate a confidence interval Under the assumption that the sources of error are independent, which is not unreasonable, it would then be straightforward to simulate an all-inclusive confidence interval for ROI, incorporating errors in the model coefficient estimate, estimated sample mean, and estimated shift that are based on an assumption of a multivariate normal distribution with orthogonal components

Discussion and Conclusions

Contributions to Theory and Practice

We make several contributions to marketing theory and practice First, we identify the important problem of making all of marketing financially accountable, and we build the first broad framework that attempts to address the problem We provide a unified framework for analyzing the impact of competing marketing expenditures and for projecting the ROI that will result from the expenditures This big-picture contribution extends the scope of ROI models in marketing, which to date have focused on the financial impact of particular classes of expenditure and have not addressed the general problem of comparing the impact of any set of competing marketing expenditures Our work is the first serious attempt to address this issue in its broadest form the trading off of any strategic marketing alternatives on the basis of customer equity Marketing Science Institute member companies have identified this research area as the most important problem they face today

Second, we provide a new model of CLV, incorporating the impact of competitors' offerings and brand switching, previous CLV models have ignored competition We also discount according to purchase rather than time period Previous CLV models have been limited to the consideration of purchases made in prespecified time units, which is realistic for some businesses (e g , subscription services, sports season tickets) but not for others (e g , consumer packaged goods) By discounting according to purchase, at the individual level, our model is more widely applicable The approach set out previously considers customer equity for the entire relevant competitive set, which has two advantages over existing approaches First, this approach considers the expected lifetime value of both existing customers and prospective customers, thereby incorporating acquisition and retention (for the focal firm and competitors) in the same model Second, by explicitly considering competitive effects in the choice decision, it is possible to use the model to consider the impact of competitive responses on the firm's customer equity.

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[13] To conserve space, we show the details only for the airline example, but the details of the other industry examples are similar

Third, we provide a method for estimating the effects of individual customer equity drivers, testing their statistical significance, and projecting the ROI that will occur from expenditures on those drivers. We present a principal components multinomial logit regression model for estimating the Markov brand-switching matrix, and we separate the driver effects from the inertia effect. The identification and measurement of key drivers has been a process widely and successfully employed in the fields of customer satisfaction measurement and customer value management (e.g., Gale 1994, Kordupleski, Rust, and Zahorik 1993). We extend this idea to customer equity. By doing so, companies can answer questions such as, "Should we spend more on advertising, or should we improve service quality?" and "Which will have a bigger effect?"

Fourth, customer equity provides a theoretical framework for making the firm truly customer centered, and it is applicable to a wide variety of market contexts and industries. Basing strategic investment on the drivers of customer equity is an outside-in approach that directly operationalizes these fundamental marketing concepts. In other words, the customer equity approach provides a means of making strategic marketing decisions inherently information driven, which is consistent with the long-term trends of decreasing costs for information gathering and information processing.

Fifth, application of the customer equity framework is consistent with practical management needs. The results provide insight into competitive strengths and weaknesses and an understanding of what is important to the customer. By contrasting the firm's customer equity, customer equity share, and driver performance with those of its competitors, the firm can quickly determine where it is gaining or losing competitive ground with respect to the value of its customer base. In addition, the model results include the distribution of CLV across the firm's customers, the distribution of CLV share (discounted share-of-wallet) across the firm's customers, and the percentage of the firm's customer equity provided by the firm's top X% of customers. Collectively, the information gives useful information about how to segment the firm's customers on the basis of importance. Finally, the mathematical infrastructure of our framework can be implemented by means of widely available statistical packages and spreadsheet programs, and we have conducted all the analyses by using only standard, commercially available software packages.

Limitations and Directions for Further Research

In this article, we have developed and illustrated a practical framework for basing marketing strategy on CLV and customer equity. As with any new endeavor, there is much work yet to be done. Specifically, we have determined seven key areas for further research. First, the effects of market dynamics on customer equity should be examined. For example, if the market is rapidly expanding or rapidly shrinking, an assumption of stable market size is inappropriate. In such markets, it would be necessary to model the changing size of the market and relate that to customer equity. This also implies the explicit modeling of a birth and death process for customers in the market. New-to-the-world products and services and markets in which firms are expanding globally are examples of contexts in which we believe this will be particularly important.

Second, our model assumes that there is one brand or product in the firm and does not consider cross-selling between a firm's brands or products. We believe that the model we have described provides a solid foundation for firms to understand what drives customer equity in a given brand or product category. However, because many firms have multiple offerings and hope to encourage customer cross-buying of these products, it will be important to understand the influence of the drivers of customer equity on customer cross-buying behavior and to incorporate the impact of cross-selling on customer equity. This is particularly important for firms that rely on customer cross-buying behavior for long-term customer profitability (e.g., financial service firms).

Third, we adopt the assumption that a customer's volume per purchase is exogenous. An extension of this research would permit volume per purchase to vary as a function of marketing effort. For example, it will be important to understand whether marketing efforts that may result in forward buying (e.g., short-term price discounts) have a long-term effect on customer equity.

Fourth, there is a need to develop dynamic models of CLV and customer equity. Traditional models of CLV have been adopted from the net-present-value approach in the finance literature. Understanding how the value of the firm's customers (and overall customer equity) changes over time will enable managers to make even better marketing investments. There is also an opportunity to develop richer models of CLV that incorporate a deeper understanding of consumer behavior.

Fifth, there is an opportunity to relate customer equity to corporate valuation (Gupta, Lehmann, and Stuart 2001). This should involve the evaluation of corporate assets, liabilities, and risk, as well as the estimated customer equity. Sixth, applications of this framework and further empirical validation of its elements would be useful, especially across different cultures. For example, in what kinds of cultures are various drivers more important or less important, and why? Seventh, although our model incorporates competition, it makes no provision for competitive reactions. An extension of this work might involve a game theoretic competitive structure in order to understand the effects of potential competitive reactions to the firm's intended improvements in key drivers of customer equity.

Summary

We have provided the first broad framework for evaluating return on marketing. This enables us to make marketing financially accountable and to trade off competing strategic marketing investments on the basis of financial return. We build our customer equity projections from a new model of CLV, one that permits the modeling of competitive effects and brand-switching patterns. Customer equity provides an information-based, customer-driven, competitor-cognizant, and financially accountable strategic approach to maximizing the firm's long-term profitability

Appendix A
Estimation Details

Principal Components Regression

The independent variables for the principal components analysis are all the drivers and the LAST variable The vector $\mathbf{X}_{ijk}$ denotes the original independent variables for each customer i by previously purchased firm j by next-purchase firm k combination Treating the customer by firm combinations as replications, we extract the largest principal components of $\mathbf{X}_{ijk}$ and rotate them using varimax rotation to maximize the extent to which the factors load uniquely on the original independent variables, thereby aiding managerial interpretability The vector $\mathbf{F}_{ijk}$ denotes the rotated factor These form the independent variables for our logit regression, which we describe subsequently

Expressing Equation 2 in terms of the underlying factors leads to the following

$$\text{(A1)} \qquad U_{ijk} = \mathbf{F}_{ijk}\gamma + \varepsilon_i,$$

where γ is a vector of coefficients

From factor analysis theory, it is known that the factors are linear combinations of the underlying variables $\mathbf{X}_{ijk}$ In other words, there exists a matrix $\mathbf{A}$ for which $\mathbf{F}_{ijk} = \mathbf{X}_{ijk}\mathbf{A}$ However, the idea of the principal components analysis was to discard the potentially muddling effects of the least important components Denoting $\mathbf{A}^*$ as the subvector of $\mathbf{A}$ that corresponds to the reduced factor space (discarding the principal components that do not meet the eigenvalue cutoff) and γ^* as the estimated γ that corresponds to the reduced space, Equation A1 can be expressed as

$$\text{(A2)} \qquad \hat{U}_{ijk} = (\mathbf{X}_{ijk}\mathbf{A}^*)\gamma^* = \mathbf{X}_{ijk}(\mathbf{A}^*\gamma^*),$$

where $\hat{U}_{ijk}$ is the estimated utility, which means that $\beta^* = \mathbf{A}^*\gamma^*$ can be the estimated coefficient vector In other words, the coefficients of $\mathbf{X}_{ijk}$ are obtained by multiplying the regression coefficients obtained from the logit regression on the factors by the factor coefficients that relate the drivers to the factors

Logit Estimation

Usually in multinomial logit regression, the observed dependent variable values are ones and zeroes, corresponding to the purchased brand (1 = "brand was purchased," 0 = "brand was not purchased") This will be the case if the next purchase is observed from a longitudinal panel or follow-up survey However, if purchase intent is used as a proxy for next purchase, the dependent variable values will be proportions that correspond to the stated (or calibrated) purchase intention probabilities This does not create any difficulties From Equation 9, we have $U_{ijk} = \mathbf{F}_{ijk}\gamma^* + \varepsilon_i$, after discarding the principal components that did not meet the cutoff Using the laws of conditional probability, we can express the likelihood of a particular parameter vector γ^* given respondent i's observed next purchase (or purchase intention) vector $\mathbf{p}^*_i$ as

$$\text{(A3)} \qquad L(\gamma^*|\mathbf{p}^*_i) = \sum_{j=1}^{J} L(\gamma^*|Y_{ij} = 1)P(Y_{ij} = 1)$$
$$= \sum_{j=1}^{J} L(\gamma^*|Y_{ij} = 1)p^*_{ij},$$

where Y_{ij} equals one if customer i chooses brand j and equals zero otherwise, the likelihoods on the right side are the usual 0–1 logit likelihood expressions obtained as in Equation 3, and p^*_{ij} is the element of $\mathbf{p}^*_i$ that corresponds to firm j The resulting likelihood for the sample is then the product of the individual likelihoods across the respondents It is easily shown that with this adjustment in the likelihood, the standard logit regression maximum likelihood algorithms can be employed (Greene 1997, p 916, 1998, pp 520, 524) The same adjustment of the likelihood does not affect the derivation of the asymptotic distribution of the regression coefficients[14] (as is evident in McFadden's [1974, pp 135–38] work), which means that the usual chi-square statistics, as given in standard logit software such as LIMDEP, can still be employed, even if the $\mathbf{p}^*_{ij}$ vector is not all zeroes and ones

From Equation 3, it is easily shown that the partial derivative of probability of choice with respect to utility, for respondent i and firm k, is[15]

$$\text{(A4)} \qquad D_{ik} = \partial P_{ik}/\partial U_{ik}$$
$$= \left\{\left[\sum_{k^*} \exp(U_{ik^*})\right][\exp(U_{ik})] - [\exp(U_{ik})]^2\right\}\Big/\left[\sum_{k^*} \exp(U_{ik^*})\right]^2$$
$$= [\exp(U_{ik})]\Big/\left[\sum_{k^*} \exp(U_{ik^*})\right] \times \left[\sum_{j \neq k} \exp(U_{ik})\Big/\sum_{k^*} \exp(U_{ik^*})\right]$$
$$= p^*_{ik}\left\{\left[\sum_{j} \exp(U_{ij}) - \exp(U_{ik})\right]\Big/\left[\sum_{k^*} \exp(U_{ik^*})\right]\right\}$$
$$= p^*_{ik}(1 - p^*_{ik})$$

Then, from Equation A2 we have

$$\text{(A5)} \qquad \partial P_{ik}/\partial \mathbf{X}_{ijk} = \partial P_{ik}/\partial U_{ik} \times \partial U_{ik}/\partial \mathbf{X}_{ijk} = (\mathbf{A}^*\gamma^*)D_{ik}$$
$$= (\mathbf{A}^*\gamma^*)\, p^*_{ik}(1 - p^*_{ik})$$

This equation shows how each customer's brand-switching matrix will change given a change in any driver (or changes in more than one driver) This result is nonlinear and implies diminishing returns for any driver improvement. By applying the altered switching matrix in Equation 4, reestimating CLV by using Equation 5, and aggregating across customers by using Equation 6, we find the impact on customer equity.

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[14] Actually, convergence is faster, because the probabilities of next purchase are given directly, so the law of large numbers does not need to be evoked with respect to the dependent variable

[15] For convenience, we suppress the j subscript for D, P, and U, because for any customer i in the sample, j is fixed

The relative importance of each driver, measured as the impact of a marginal improvement in the driver on utility, can also be addressed as a proportion of the total marginal impact summed across all drivers. In other words, the importance of driver x is the per-unit amount that it contributes to utility, and the relative importance is that amount expressed as a percentage.

(A6) $$\text{Importance} = \sum_{c=1}^{C} (A_{cx}\gamma_c), \text{ and}$$

(A7) Relative importance

$$= \left[\sum_{c=1}^{C} (A_{cx}\gamma_c) \Big/ \sum_{x^* \in S_d} \sum_{c=1}^{C} (A_{cx^*}\gamma_c) \right] \times 100,$$

where C is the set of retained principal components, A_{cx} is the factor coefficient relating driver x to factor c, and γ_c is the logit coefficient corresponding to factor c.

In addition, we address the statistical significance of the drivers. The coefficients, γ_c, as estimated by the logit model, are distributed asymptotically normally, and mean and variance are estimated and reported by standard logit regression software. If the estimated logit coefficient and variance of the estimate for factor c are $\hat{\gamma}_c$ and σ_c^2, respectively, and $\beta_x = \Sigma_c A_{cx}\gamma_c$ is the coefficient estimator for driver x, then, if we assume that the $\hat{\gamma}_c$'s are distributed independently, β_x is a linear combination of independent normal distributions and thus is also normally distributed. Specifically,

(A8) $$\text{Standard error of } \beta_x = \left(\sum_c A_{cx}^2 \sigma_c^2 \right)^{\frac{1}{2}},$$

which results asymptotically in the following z-test for β_x:

(A9) $$z = \beta_x \Big/ \left(\sum_c A_{cx}^2 \sigma_c^2 \right)^{\frac{1}{2}},$$

which is easily calculated from the results of the principal components analysis (for A_{cx}^2) and logit analysis (for β_x and σ_c^2).

Computational Issues in Estimating CLV

If the time horizon is long or the customer's frequency of purchase is high, there may be many purchases expected before the time horizon, which increases computation considerably. Therefore, it is useful to make a simplifying approximation that can speed up the computation. In practice, the expected purchase probabilities, B_{ijt}, approach equilibrium and change little after about 15 purchases. This enables us to employ the approximation that the purchase probabilities do not change after 15 purchases. If $T_i \leq 15$, we can estimate CLV_{ij} as in Equation 5. However, if $T_i > 15$, we can simplify the calculations. Let $CLV_{ij}(15)$ denote the lifetime value of customer i to firm j in 15 purchases, as calculated by Equation 5, and let $CLV_{ij}{}^*(T_i)$ and $CLV_{ij}{}^*(15)$ denote the lifetime values that would occur (through T_i purchases and 15 purchases, respectively) if the purchase probabilities were constant and equal to $B_{ij,15}$.[16] The expected lifetime value of the purchases beyond purchase 15 can be approximated as $CLV_{ij}{}^*(T_i) - CLV_{ij}{}^*(15)$. This is helpful because CLV* can be viewed as a net present value of an annuity, and it can be calculated in closed form because the probabilities $B_{ij,15}$ are constant. Expressing the individual-specific discount rate per purchase as $d_i{}^* = d_i{}^{-1/f_i}$, we have the standard expression for the net present value of an annuity:

(A10) $$CLV_{ij}{}^*(t) = v_{ijt}\pi_{ijt}B_{ij,15}(1/d_i{}^*)[1 - (1 + d_i{}^*)^{-t}],$$

from which we obtain the estimated lifetime value of

(A11) $$\text{Estimated } CLV_{ij} = CLV_{ij}(15) + CLV_{ij}{}^*(T_i) - CLV_{ij}{}^*(15).$$

Appendix B
Example Survey Items (Airline Survey)

Here are some examples of survey items that might be used to measure customer equity and its drivers. These items are from the survey that we used to analyze the airline market. (The headings in this Appendix are for explanatory purposes and would not be read to the respondent.)

Market Share and Transition Probabilities

1. Which of the following airlines did you most recently fly? (please check one)
2. The next time you fly a commercial airline, what is the probability that you will fly each of these airlines? *Probability (please provide a percentage for each airline, and have the percentages add up to 100%)*

Size and Frequency of Purchase

3. When you fly, how much on average does the airline ticket cost?

_____less than $300
_____between $300 and $599
_____between $600 and $899
_____between $900 and $1199
_____between $1200 and $1499
_____between $1500 and $1799
_____between $1800 and $2099
_____$2100 or more

4. On average, how often do you fly on a commercial airline?

_____once a week or more
_____once every two weeks
_____once a month
_____3–4 times per year

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[16] We could also use the equilibrium probabilities. In practice, there is little difference between the two.

_____once a year
_____once every two years, or less

Value-Related Drivers

5 How would you rate the overall quality of the following airlines? (5 = "very high quality," 1 = "very low quality")
6 How would you rate the competitiveness of the prices of each of these airlines? (5 = "very competitive," 1 = "not at all competitive")
7 The airline flies when and where I need to go (5 = "strongly agree," 1 = "strongly disagree")

Brand-Related Drivers (5 = "Strongly Agree," 1 = "Strongly Disagree")

8 I often notice and pay attention to the airline's media advertising
9 I often notice and pay attention to information the airline sends to me
10 The airline is well known as a good corporate citizen
11 The airline is an active sponsor of community events
12 The airline has high ethical standards with respect to its customers and employees
13 The image of this airline fits my personality well

Relationship-Related Drivers (5 = "Strongly Agree," 1 = "Strongly Disagree")

14 I have a big investment in the airline's loyalty (frequent flyer) program
15 The preferential treatment I get from this airline's loyalty program is important to me
16 I know this airline's procedures well
17 The airline knows a lot of information about me
18 This airline recognizes me as being special
19 I feel a sense of community with other passengers of this airline
20 I have a high level of trust in this airline

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D. Todd Donavan, Tom J. Brown, & John C. Mowen

Internal Benefits of Service-Worker Customer Orientation: Job Satisfaction, Commitment, and Organizational Citizenship Behaviors

Implementation of the marketing concept in service firms is accomplished through individual service employees and their interactions with customers Although prior research has established a link between service-worker customer orientation and performance outcomes, little research has addressed other potentially important outcomes of customer orientation Drawing from the literature on person–situation interaction and fit theory, the authors develop and test a model that explains how service-worker customer orientation affects several important job responses, including perceived job fit, job satisfaction, commitment to the firm, and organizational citizenship behaviors Across three field studies in two distinct services industries, the results indicate that the positive influence of customer orientation on certain job responses is stronger for service workers who spend more time in direct contact with customers than for workers who spend less time with customers The authors discuss the implications of the results for services marketing managers and researchers

Marketing theorists have long argued that firms that focus on their customers' needs are better positioned to achieve long-term success than are companies that do not (Deshpandé, Farley, and Webster 1993, Kotler 2000) Indeed, empirical research has demonstrated several positive outcomes of a market orientation, including enhanced profitability (Narver and Slater 1990), employee commitment, and esprit de corps (Jaworski and Kohli 1993) Implementation of the marketing concept in service firms is accomplished through service employees and their interactions with customers At the individual service-worker level, customer orientation (CO) has been shown to exert positive effects on performance outcomes (e g , Brown et al 2002)

One purpose of our research is to investigate additional benefits of service-worker CO beyond its effects on performance Theorists have noted the importance of worker satisfaction and commitment in retaining service workers, as well as the importance of worker retention to the success of the services organization (Heskett et al 1994, Schneider and Bowen 1993) Other scholars have noted the significant role of organizational citizenship behaviors (OCBs), or employee behaviors that go beyond specified job requirements, in promoting positive outcomes for an organization (e g , Bateman and Organ 1983, Podsakoff and MacKenzie 1994) As we describe in the theory section, we predict that CO is associated with higher levels of job satisfaction, commitment, and OCBs Such findings further highlight the value of hiring and retaining customer-oriented service workers

Another goal of our research is to begin to establish boundary conditions on the influence of CO Substantial research suggests that individual characteristics and situational variables often jointly determine outcomes For example, the interaction between person and situation has been shown to affect job performance (Caldwell and O'Reilly 1990), job burnout (Maslach and Goldberg 1998), job retaliation (Skarlicki, Folger, and Tesluk 1999), and retention (Hayward and Everett 1983) Drawing from fit theory (e g , Chatman 1989, 1991, Kristof 1996, Nadler and Tushman 1980, O'Reilly, Chatman, and Caldwell 1991, Super 1953), we argue that CO (a personal characteristic) will be more influential on service-worker satisfaction and commitment as workers spend more time in contact with customers (a situational variable)

The article is organized as follows We initially review prior theory and research pertaining to CO and fit theory We then develop hypotheses about the internal consequences of CO Next, we present the methods and results from three field studies with workers in the financial services and hospitality industries We conclude by discussing the implications for services marketing researchers and managers

Literature Review

Researchers have investigated the implementation of the marketing concept at both the organizational and the individual levels Researchers working at the organizational level have identified several organizational outcomes of

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market orientation (e g , Jaworski and Kohli 1993, Kohli and Jaworski 1990, Narver and Slater 1990) Narver and Slater (1990) find evidence that as organizations increase their level of market orientation, their organizational performance increases as well Narver and Slater propose that market orientation involves three behavioral components (1) CO (i e , focus on customers), (2) competitor orientation (i e , focus on competitors), and (3) interfunctional coordination (i e , coordinated use of company resources)

However, our research addresses how the marketing concept is implemented at the level of the individual worker Work in this research stream can be traced to a seminal article by Saxe and Weitz (1982), who found evidence that a two-dimensional "selling orientation–customer orientation" measure (i e , SOCO) was connected to salesperson performance They propose (p 344) that customer-oriented selling is a behavioral concept that refers to "the degree to which salespeople practice the marketing concept by trying to help their customers make purchase decisions that will satisfy customer needs " Follow-up research has investigated salesperson CO as consumers and organizational buyers view it (i e , Brown, Widing, and Coulter 1991, Michaels and Day 1985, Tadepalli 1995) and has examined the relationships among CO and customer satisfaction (e g , Reynierse and Harker 1992), salespeople's ethical behavior (Howe, Hoffman, and Hardigree 1994), commitment to the organization (Kelley 1992, Pettijohn, Pettijohn, and Taylor 2002), job satisfaction (Hoffman and Ingram 1991, 1992, Pettijohn, Pettijohn, and Taylor 2002), and market orientation of the organization (Siguaw, Brown, and Widing 1994)

Recently, Brown and colleagues (2002, p 111) defined CO as an "employee's tendency or predisposition to meet customer needs in an on-the-job context" They found that CO was influenced by deeper personality traits and, in turn, influenced worker performance This perspective is consistent with traditional views of personality For example, Pervin and John (1997, p 4) define personality as the "characteristics of the person that account for consistent patterns of feeling, thinking, and behaving "[1]

As do Brown and colleagues (2002), we treat CO as a surface-level personality trait within a hierarchical personality model As Mowen (2000) proposes, surface traits are enduring dispositions to act within context-specific situations From this perspective, CO is an enduring disposition (i e , consistent over time) to meet customer needs The context-specific situation is the interaction that takes place between the service provider and the customer In a hierarchical model, CO is influenced by more basic traits (e g , agreeability, emotional stability, activity needs), in turn, it influences outcome variables, such as service-worker performance on job-related tasks Although viewing CO as a trait is inconsistent with Saxe and Weitz's (1982) approach, it is consistent with the research that takes a hierarchical approach to personality (e g , Allport 1961, Lastovicka 1982, Mowen 2000) Brown and colleagues (2002) demonstrate that CO mediates the relationships between more basic personality traits and service performance Furthermore, the approach is consistent with the proposal that behavior is a function of both person and environment (Bowers 1973, Magnusson and Endler 1977), that is, any particular customer-oriented behavior will result from the combination of person (e g , personality, goals, functional motives) and environment (e g , nature of the job, short-term situational effects) We explore this interactive relationship in our research [2]

To develop a four-dimensional conceptualization of CO (i e , need to pamper the customer, need to read the customer's needs, need for personal relationship, and need to deliver the service required), we use extensive qualitative research and measure development efforts We argue that CO can produce internal benefits to the service employee (i e , enhanced satisfaction and commitment) and ultimately to the firm through the performance of OCBs Furthermore, we believe that the magnitude of the effects of CO on several of the outcomes is contingent on a key aspect of the work environment, that is, the relative amount of time that the service worker spends with customers

Person–Situation Fit in Organizations

Fit theory offers a rationale for the CO hypotheses that we develop herein Fit theory derives from interactional psychology, which suggests that the person and the environment or situation combine to affect the person's behavior (Chatman 1991, Nadler and Tushman 1980) Moreover, the interaction between the two variables increases the amount of variance explained

In an organizational context, organizational behavior and marketing researchers have approached the notion of fit between worker and environment in several ways As Kristof (1996) notes, there is a distinction between the organization itself and the specific job tasks expected of an employee Accordingly, in general, prior approaches to worker–environment fit can be grouped into two categories (1) fit between the worker and the specific organization and (2) fit between the worker and the tasks associated with a particular job The latter type of fit, usually labeled person–job (P–J) fit, is the type of person–situation fit that we address herein

The P–J fit pertains to the degree of match between the personality, skills, and ability of the worker and the requirements of specific jobs or job tasks People select themselves into jobs that best match their abilities and interests (Wilk, Desmarais, and Sackett 1995) Edwards (1991) defines P–J fit as the congruence between the person's abilities and the demands of a job However, note that P–J fit is more than just a person's abilities, and it extends to the personality of the worker For example, Super's (1953) theory of vocational development suggests that people choose vocations on the basis of fit between their own personalities and the career Holland (1977, 1985) notes both that the worker and the particular job have personalities and that fit is determined by the congruence between the two personalities Nadler and Tushman (1980) argue that when the demands of the job tasks match the characteristics of the worker, performance is enhanced In our research, we consider other consequences of the match between the worker and the services job

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[1] Personality research has a long history in marketing (see Kassarjian 1971) Attention in recent years has focused on using personality to predict such things as salesperson and service-provider performance (Brown et al 2002, Hakstian et al 1997, Hurley 1998), ad-evoked feelings (Mooradian 1996), consumers' postpurchase outcomes, such as satisfaction, loyalty, and word-of-mouth behavior (Mooradian and Olver 1997), and brand attitude (Aaker 1999)

[2] As a reviewer noted, the distinction between dispositional CO and behavioral CO is not great Allport (1961) describes surface personality traits as summaries of behaviors, and many personality traits are measured by means of items that assess behavioral tendencies (e g , frugality [Lastovicka et al 1999], need for uniqueness [Tian, Bearden, and Hunter 2001], consumer susceptibility to interpersonal influence [Bearden, Netemeyer, and Teel 1989])

Consequences of CO

Our goal is to examine the effect of CO on service workers' responses to their jobs In particular, we identify three outcomes of service workers' enhanced CO higher levels of (1) organizational commitment, (2) job satisfaction, and (3) OCBs We focus on commitment and satisfaction because of their implications for service-worker retention (e g , Mobley 1977, Morgan and Hunt 1994, Porter and Steers 1973) Because of OCBs' role in the ongoing functioning of the organization, they are notable (e g , Organ 1988, MacKenzie, Podsakoff, and Fetter 1993)

Job Satisfaction and Organizational Commitment

On the basis of a P–J fit mechanism, we propose that service workers who have higher degrees of CO will express higher levels of job satisfaction (e g , Edwards 1991, Super 1953) In contexts in which the primary task is the serving of customer needs, customer-oriented employees fit the service setting better than employees who have lower CO because they are predisposed to enjoy the work of serving customers Consequently, service employees who have higher degrees of CO will be more satisfied with their jobs than will employees who have less CO

Researchers have investigated the possible relationship between job satisfaction and CO (Hoffman and Ingram 1991, 1992, Pettijohn, Pettijohn, and Taylor 2002) Using the behaviorally oriented SOCO scale (Saxe and Weitz 1982), each research team concluded that increasing levels of satisfaction produce higher levels of CO We argue that as a characteristic of the employee, dispositional CO will lead to job satisfaction, not vice versa That is, a customer-oriented service worker is a more natural fit in a service job and, as a result, will experience greater job satisfaction The direction of causality is a key issue because of the resulting recruiting implications for services managers If CO is a consequence of job satisfaction, less emphasis can be placed on identifying customer-oriented job prospects Conversely, if satisfaction results from CO, managers should devote effort to hiring workers who possess a customer-oriented personality We address the direction of the causality issue in our empirical work

H_1 Service-worker CO will exert a positive influence on job satisfaction

In their research on organizational market orientation, Jaworski and Kohli (1993, Kohli and Jaworski 1990) find that employees experience greater commitment to the organization when they believe the company practices the marketing concept We suggest that the same effect is also found at the individual level for service workers Service firms implement the marketing concept through their employees Thus, as the service workers experience deeper levels of CO, they will become more committed to the organization

Similar to CO's effects on job satisfaction, we expect that customer-oriented employees will fit the job setting better than employees who have lower levels of CO Consequently, these workers will experience higher levels of commitment to their organizations Kelley (1992) and Pettijohn, Pettijohn, and Taylor (2002) argue that organizational commitment is an antecedent of CO rather than an outcome of CO, as we position it However, we posit that it is the fit of the context and the worker's predisposition toward meeting customer needs that produces the opportunity for organizational commitment to develop This leads to the following hypothesis

H_2 Service-worker CO will exert a positive influence on organizational commitment

Previous research suggests that job satisfaction has a positive influence on commitment (e g , Brown and Peterson 1993, DeCotiis and Summers 1987, Williams and Hazer 1986) Thus, the influence of CO on commitment will be partially mediated through satisfaction

H_3 The influence of service-worker CO on organizational commitment will be partially mediated by job satisfaction

We have argued that workers disposed toward meeting customer needs fit better in a service organization than do workers who are less disposed toward meeting customer needs However, different jobs, even in the same organization, require different amounts of actual time spent with customers, a variable that we label "contact time"[3] Consequently, we propose that the positive influence of CO on commitment and satisfaction will be stronger (weaker) for workers who spend more (less) time in contact with customers For example, a service worker who has higher levels of CO will be especially satisfied with and committed to a job when that job requires higher amounts of time spent with customers In contrast, the degree of CO may be less relevant to job outcomes for workers who spend little time in contact with customers

The literature on person–situation interactions offers support for our ideas Individual responses are often driven by the interplay of personal and environmental factors rather than either factor alone (e g , Bowers 1973, Magnusson and Endler 1977) A person brings certain characteristics with him or her into a situational context, and the resulting behaviors and responses depend on the interaction of the personal characteristics and situational variables. Thus, we argue that the degree of CO (a personality characteristic) will interact with customer-contact time (a situational variable) in the following manner:

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[3] Contact time is largely a function of job requirements, but it may be influenced by individual differences, including CO Thus, two workers may have identical job descriptions but spend different amounts of time with customers In our empirical work, we account for the possible influence of CO on contact time

> H_4: The positive influence of service-worker CO on service-worker (a) job satisfaction and (b) organizational commitment will be stronger when contact time is high than when contact time is low.

OCBs

We define OCBs as the noncompulsive, helpful, and constructive behaviors that are directed to the organization or to its members (Bateman and Organ 1983; Podsakoff and MacKenzie 1994). Although OCBs are not a part of general job requirements (Organ 1988), they can affect supervisors' evaluations of employees (MacKenzie, Podsakoff, and Fetter 1993). Although employees may not be objectively evaluated on OCBs, research suggests that OCBs positively influence the work environment.

Although several OCB dimensions have been identified, altruism appears to be especially important in the current context. *Altruistic OCB* (hereafter, OCB-altruism) is defined as one employee helping another employee who has a work-related problem (MacKenzie, Podsakoff, and Fetter 1993). We posit that customer-oriented employees are motivated to help fellow employees as a means of ultimately satisfying customers; that is, customer-oriented employees recognize that for successful exchanges with customers to occur, effective internal exchanges must occur first (George 1990; Gronroos 1990). Contact employees who are inclined to meet customer needs will go beyond the call of duty to assist coworkers. As a result, higher levels of CO will lead to higher levels of OCB-altruism.

> H_5: Service-worker CO will exert a positive influence on OCB-altruism.

We further suggest that as service employees become more satisfied with their jobs, helpful behaviors will increase. It has been shown that job satisfaction is correlated with altruism (Bateman and Organ 1983; Organ and Ryan 1995; Smith, Organ, and Near 1983). Consequently,

> H_6: The influence of service-worker CO on OCB-altruism will be partially mediated by job satisfaction.

We do not anticipate that the degree of contact time will moderate the relationship between CO and OCB-altruism. On the one hand, it seems reasonable that as a response to CO, OCB-altruism should be subject to the same person–situation influences as other responses (i.e., job satisfaction, commitment). As a result, the match of personality and environment should produce a corresponding enhancement of OCB-altruism. On the other hand, there is a potential countervailing effect. Workers who have high CO but are constrained in lower-contact-time environments may be more inclined than workers in high-contact-time positions to perform OCB-altruism as a means of ultimately satisfying customer needs. That is, if the workers cannot directly meet customer needs as frequently as they would like, they might perform OCB-altruism at an increased rate. As a result, we offer no hypothesis about the possible moderating role of contact time on the relationship between CO and OCB-altruism, though we test the effect in our empirical work.

In the following sections, we present three field studies that test our hypotheses. In Studies 1 and 2, we develop a measure of CO and test our hypotheses in two distinct services contexts, which provides evidence of generalizability. In Study 3, we examine the mediational role of a direct measure of job fit.

Study 1

In Study 1, we collected data from the employees of a financial institution. The financial services industry was appropriate for testing our hypotheses for various reasons. Financial institutions employ millions of people in jobs ranging from low customer contact (e.g., internal auditing, credit analysis) to high customer contact (e.g., consumer lending, commercial lending, customer service). Furthermore, financial services are "pure" services in the sense that transactions involve few tangibles. Many of the services that financial institutions offer are continuous in nature rather than discrete.

We collected data from the employees of a midsize bank located in a Midwestern city. After bank management's participation was secured, blank questionnaires and self-addressed stamped envelopes were distributed by the managers of each of the bank's departments. We assured all participants that their individual answers would be held in confidence. All 250 of the bank's employees were asked to complete the survey during work time and to mail it directly to one of us. We received 156 completed surveys, for a response rate of 62%. The questionnaire included measures of CO, job satisfaction, organizational commitment, OCB-altruism, and contact time, presented in that order.

Most respondents were female (81%); the median tenure at the bank was 19 months. Contact time ranged from 20% to 100%; 55% of respondents reported spending at least 60% of their time with customers.

Measures and Analysis

CO. In developing a measure of CO, we used appropriate measurement development techniques (e.g., Anderson and Gerbing 1988; Churchill 1979). In particular, we sought to explore the potential dimensionality of the construct. We gathered extensive qualitative data to better define the nature of CO. We conducted personal interviews with six service managers from diverse service settings (e.g., food service, financial services, travel agency) and two focus groups, one with customers and one with nonmanager customer-contact employees. Two judges independently analyzed written transcripts from the interviews and focus groups to identify CO themes.

On the basis of a review of literature and our qualitative research, we developed 98 statements that reflected different aspects of CO. Five academicians who study services marketing and five managers who did not participate in the interviews evaluated the items for face validity. Using their feedback and multiple rounds of data collection and exploratory factor analysis, we reduced the number of items to 23 across four dimensions We subsequently discuss these dimensions and their relationship to another measure of CO recently introduced into the literature

Employees' need to pamper the customer represents the degree to which service employees desire to make customers believe they are special, that is, individually important to the service provider The service provider's need to read the customer reflects the employee's desire to pick up on customers' verbal and nonverbal communication The service employee's need for personal relationship captures the employee's desire to know or connect with the customer on a personal level Finally, customer-oriented employees' need to deliver reflects their desire to perform the service successfully We included the items that assess these four proposed dimensions as our measure of CO

A review of the items we used to assess CO (see the Appendix) reveals that they are complementary to the needs and enjoyment facets of CO that Brown and colleagues (2002) developed Indeed, both the desire to meet customer needs and the enjoyment of doing so are reflected across the four dimensions In Study 3, we compare our results with those we obtained using Brown and colleagues' measure

Other measures To assess an employee's organizational commitment, we used three items adapted from Morgan and Hunt's (1994) research (e g , "The relationship my firm has with me is something to which I am very committed") We used a global measure of job satisfaction that asked respondents to rate the level of satisfaction with their "overall job" on a 7-point scale (1 = "very dissatisfied" and 7 = "very satisfied") The use of a global scale enabled us to capture an overall assessment without either focusing on any one of the several reported dimensions of job satisfaction or including many items (e g , Churchill, Ford, and Walker 1974) To assess OCB-altruism, we used three items that measured the altruism dimension, adapted from MacKenzie, Podsakoff, and Fetter's (1993) work We assessed the proportion of time spent with customers, or contact time, on an 11-point scale that ranged from 0% to 100% in 10% increments (i e , 0%, 10%, 20%, and so on) We used this measure in tests of moderation Finally, we included a six-item measure of socially desirable responding (SDR) based on Strahan and Gerbasi's (1972) short version of Crowne and Marlowe's (1960) scale (For all the measures we used in our analyses, see the Appendix)

We analyzed our data using structural equations modeling with Amos 4 0 (Arbuckle 1997) Because we used a single item to assess overall job satisfaction, we assumed a reliability level of 85 to allow for measurement error, and we fixed the path coefficient and error variance accordingly (see Hair et al 1998, Joreskog and Sorbom 1993)

To test the moderation hypotheses, we created two groups of employees (i e , high contact and low contact) based on the measure of contact time Because the amount of time that a worker spends with a customer might be influenced by the worker's degree of CO, thereby possibly confounding the interpretation of the proposed moderation effect, we removed the effect of CO on contact time before we formed groups We regressed the contact time measure on CO and then performed a median split on the residuals from the regression analysis to form the high- and low-customer-contact groups Because of the importance of group formation, we used robust regression (Neter et al 1996) to control for the effects of outliers on the estimation of the regression equation As a result of these procedures, any differences in the relationships between CO and its proposed consequences (i e , job satisfaction, commitment) across groups cannot be an artifact of the relationship between CO and contact time We then performed a two-group structural equation modeling analysis

Validation of the CO measure To purify further the multidimensional measure of CO, we performed a confirmatory factor analysis in which we loaded the indicators on their appropriate dimensions Of the 23 items, we dropped 9 at this stage because of poor loadings in the confirmatory analyses and/or evidence of cross-loading on one or more additional dimensions In addition, we deleted one item on the grounds of insufficient face validity It appeared to be conceptually dissimilar to the other items in its dimension The remaining items loaded on the four dimensions of CO According to the criteria recommended by Fornell and Larcker (1981), a confirmatory factor analysis with the four dimensions as latent constructs confirmed discriminant validity between the dimensions We also tested the validity of our conceptualization by using a second-order factor model The results (χ^2 = 119 72, degrees of freedom [d f] = 61, $p <$ 01, comparative fit index [CFI] = 96, Tucker–Lewis index [TLI] = 95, and root mean square error of approximation [RMSEA] = 08) indicate that each CO dimension loaded strongly on the second-order factor Consequently, we computed mean scores for each of the four dimensions of CO and treated them as separate indicators of the CO latent variable in our structural equations analyses

Results

Table 1 provides descriptive statistics and pairwise correlations for Study 1 Model fit for the measurement model was good (χ^2 = 81 11, d f = 39, $p <$ 01, CFI = 95, TLI = 93, and RMSEA = 08) Composite reliability and average variance extracted were strong for all latent variables (see Table 1) In addition, all model constructs exhibited discriminant validity with respect to the standards Fornell and Larcker (1981) suggest Given the discriminant validity and evidence of nomological validity (see the subsequent section), we conclude that all measures exhibited construct validity

Structural model results We derived the full structural model from our hypotheses, the model is presented in Figure 1 Structural model fit was good (χ^2 = 81 33, d f = 40, $p <$ 01, CFI = 95, TLI = 94, and RMSEA = 08) Table 2 presents the standardized path coefficients (SPCs) and associated t-values for all relationships in the structural model

A purpose of our research is to consider the effects of service-worker CO on job satisfaction, organizational commitment, and OCB-altruism H_1 suggests that as the employee's level of CO increases, his or her level of job satisfaction also increases The results reported in Table 2 support this effect (SPC = 34, t = 4 03) We also predicted that CO exerts a positive influence on service-worker commitment to the organization, the results support our hypothesis

TABLE 1
Study 1: Descriptive Statistics and Pairwise Correlations (Bank)

Variable	Mean	Standard Deviation	Composite Reliability	Average Variance Extracted	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) OCBs	4 80	1 20	91	77	1 00														
(2) CO	5 52	91	88	65	43	1 00													
(3) Satisfaction	4 78	1 49	92[b]	N A	48	30	1 00												
(4) Commitment	5 81	86	96	90	27	52	18*	1 00											
Individual Indicators																			
(5) Pamper	5 49	1 03			41	91	31	55	1 00										
(6) Read	4 70	1 12			28	80	20*	39	66	1 00									
(7) Deliver	6 19	88			35	79	14[a]	37	67	49	1 00								
(8) Personal relationship	5 70	1 26			30	87	31	42	75	52	60	1 00							
(9) OCB1	4 67	1 38			88	33	50	21	29	24	29	29	1 00						
(10) OCB2	5 43	1 29			79	48	26	26	47	36	44	35	60	1 00					
(11) OCB3	4 31	1 59			86	30	44	21	31	16*	20*	33	65	48	1 00				
(12) COM1	5 50	1 23			18*	38	12[a]	85	38	30	27	31	14[a]	13[a]	20*	1 00			
(13) COM2	5 96	85			28	51	22	86	57	33	38	44	23	33	17*	50	1 00		
(14) COM3	5 97	89			26	48	17*	91	54	36	35	38	22	26	18*	60	85	1 00	
(15) SD	4 61	98			17*	21	12[a]	24	30	09[a]	15[a]	17*	19*	14[a]	10[a]	11[a]	28	26	1 00

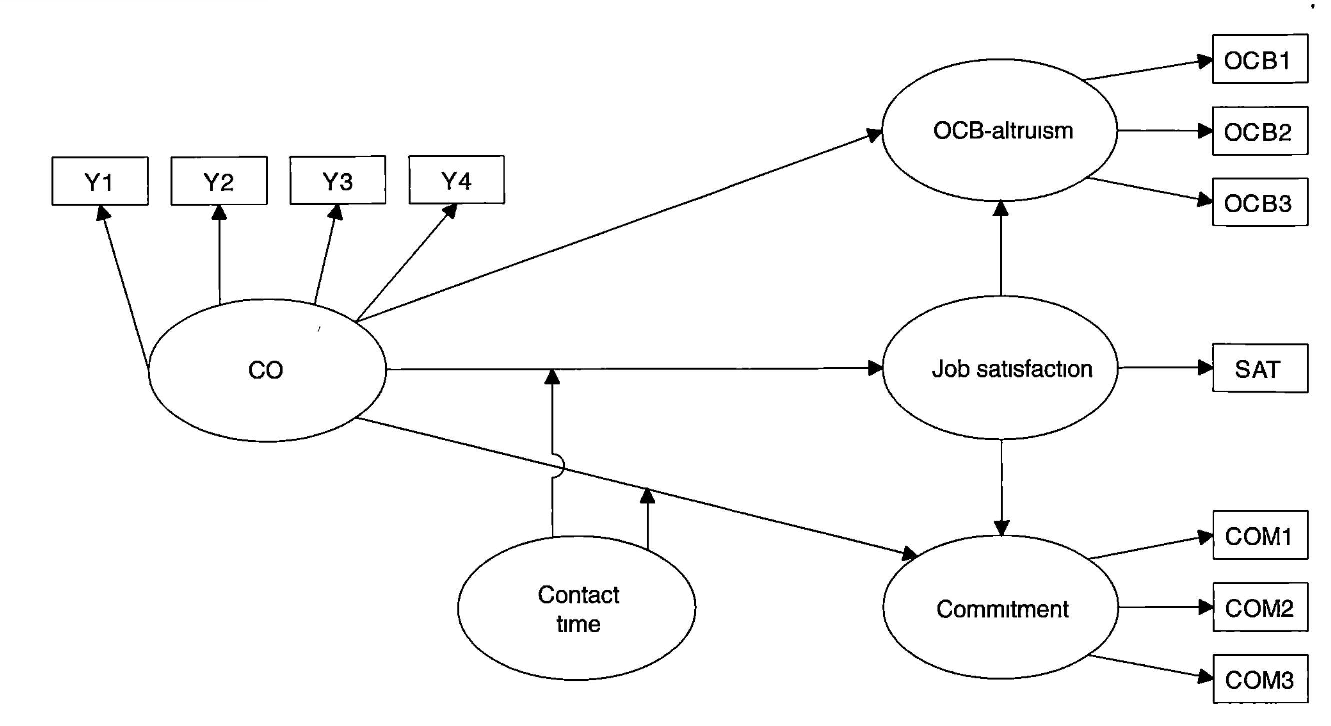
*$p < 05$

[a] Not significant (for all other correlations [unless otherwise indicated], $p < 01$)

[b] Fixed path

Notes N A = not applicable

FIGURE 1
Empirical Model: Studies 1 and 2



(i e , H_2 SPC = 60, t = 5 82) In H_3, we predicted that the influence of CO on commitment is partially mediated by job satisfaction To test this, we examined the linkage between job satisfaction and commitment Contrary to our expectations, the relationship was not significant (SPC = 01, t = 09) H_5 predicted that as the level of CO increases, the level of OCB-altruism increases The results support this proposition (SPC = 28, t = 3 28) In addition, the expected relationship between job satisfaction and OCB-altruism emerged (SPC = 48, t = 5 11), providing evidence of partial mediation of CO on OCB-altruism by job satisfaction (H_6)

Moderation tests As we noted previously, we created low- and high-contact-time groups after we adjusted for the effect of CO on contact time[4] Both resulting groups contained 78 respondents In our moderation tests, we compared two models, one in which we constrained all paths in the two groups to be equal and one in which we allowed the path between CO and a particular outcome variable (i e , commitment, satisfaction, or OCB-altruism) to vary across groups The resulting single degree of freedom χ^2 test provides a statistical test of moderation

The fully constrained model had χ^2 = 170 68 with 105 degrees of freedom The effect of CO on both commitment and job satisfaction was statistically stronger for the high-contact group than for the low-contact group (commitment $\Delta\chi^2$ = 14 33, Δd f = 1, $p <$ 05, high-contact group SPC = 75, low-contact group SPC = 38, satisfaction $\Delta\chi^2$ = 4 07, Δd f = 1, $p <$ 05, high-contact group SPC = 46, low-contact group SPC = 16) These results support H_4

We also tested for the possible moderating effect of contact time on the relationship between CO and OCB-altruism There was no difference in the influence of CO on OCB-altruism across groups ($\Delta\chi^2$ = 03, d f = 1, $p >$ 10)

Follow-up tests To test whether a bias toward SDR influenced our results, we created an index for the SDR scale, fixed the measurement path coefficient and error variance based on coefficient alpha for the measure (α = 74), added paths between SDR and the other latent variables in the model, and reran the structural model The results demonstrate that SDR had a significant effect on CO (SPC = 33, t = 3 58) However, the addition of the SDR latent variable did little to change the structural paths in the model (see Table 2), so SDR bias cannot account for the results To assess the effects of common method variance on the results, we used procedures recommended by Williams and Anderson (1994) and MacKenzie, Podsakoff, and Fetter (1993) We added a "method" factor with all indicators for all latent variables loading on this factor and on their respective latent variables Several indicators loaded significantly on the method factor, but the structural results were completely consistent with the results reported in the structural model (for complete common method results, see Table 2)

Given that previous researchers have argued that CO is an outcome rather than an antecedent of satisfaction and

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[4] The Pearson product–moment correlations between CO and contact time were positive and statistically significant in Studies 1 (r = 24), 2 (r = 24), and 3 (r = 40)

TABLE 2
Results of Structural Equations Analyses for Study 1 (Bank)

Structural Model Statistics	Results	Results with SDR	Methods Test Results
χ^2	81 33	91 27	57 15
d f	40	47	30
CFI	95	95	97
TLI	94	93	94
RMSEA	08	08	08

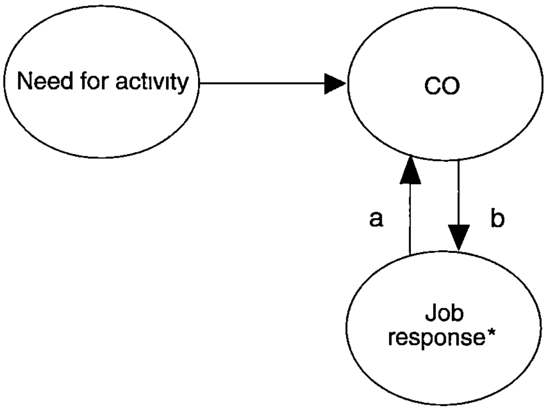
Path	Path Estimate	t-Value	Path Estimate	t-Value	Path Estimate	t-Value
CO → job satisfaction (H_1)	34	4 03**	32	3 57**	32	3 70**
CO → commitment (H_2)	60	5 82**	54	5 33**	55	5 36**
Job satisfaction → commitment	01	09	00	01	01	11
CO → OCBs (H_4)	28	3 28**	25	2 80**	28	3 19**
Job satisfaction → OCBs (H_5)	48	5 11**	48	5 11**	48	5 06**
Social Desirability Effects						
SDR → CO			33	3 58**		
SDR → job satisfaction			04	40		
SDR → commitment			16	1 82*		
SDR → OCBs			07	1 79		
Measurement Paths						
Y1 (Pamper)	1 00	Fixed	1 00	Fixed	1 00	Fixed
Y2 (Read)	68	10 24	68	10 23	70	10 02
Y3 (Deliver)	71	10 85	70	10 82	69	10 35
Y4 (Personal relationship)	79	12 87	78	12 86	77	12 18
OCB1	1 00	Fixed	1 00	Fixed	1 00	Fixed
OCB2	87	8 27	88	8 26	86	8 06
OCB3	74	7 78	74	7 76	76	7 65
SAT	92	Fixed	92	Fixed	92	Fixed
COM1	1 00	Fixed	1 00	Fixed	1 00	Fixed
COM2	89	8 56	89	8 54	75	4 25
COM3	95	8 62	95	8 61	80	4 33
SD			86	Fixed		
Method Effects						
Method → personal relationship					1 00	Fixed
Method → deliver					17	2 17**
Method → read					05	56
Method → pamper					27	4 20**
Method → COM1					– 28	–1 40
Method → COM2					64	4 89**
Method → COM3					39	3 00**
Method → SAT1					12	1 38
Method → OCB1					25	1 37
Method → OCB2					11	2 94**
Method → OCB3					01	08

*$p < 05$
**$p < 01$

Notes n = 156 Standardized path estimates are shown The error associated with the common method factor was fixed at 05 because of a negative error variance The Study 1 results include (1) basic model only, (2) basic model with the addition of the social desirability effects, and (3) basic model with the results of a common method factor In a test of a common method factor, two models are compared one in which all the paths from the common method factor are fixed at zero and one in which the method factor is freed The common method factor results shown are from the freed model only As shown, only five relationships were affected by common method factor (i e , Deliver, Pamper, COM2, COM3, OCB2), however, the effects did not significantly affect the results of the hypothesized paths

commitment, it was important to determine which causal ordering our data empirically supported Using a model structure outlined by Rigdon (1995), we fit separate models with reciprocal paths between (1) CO and job satisfaction and (2) CO and commitment The basic model is shown in Figure 2 For the models with dual paths to be statistically identified, we included a single antecedent variable, need for activity, which is a variable Brown and colleagues (2002) identify as a determinant of CO These models enabled us to test which causal path (i e , a or b), if any, the data support

FIGURE 2
Model for Testing Causal Order Between CO and Its Proposed Consequences



*Satisfaction or commitment
Notes For convenience, measurement paths are not shown

The results provide strong evidence that CO leads to higher levels of job satisfaction and commitment, not vice versa For both job responses, the path from CO to the response was statistically significant and positive (i e , job satisfaction SPC = 48, t = 1 71, organizational commitment SPC = 94, t = 3 31), whereas the path from the response to CO was nonsignificant (i e , job satisfaction SPC = – 17, t = – 49, organizational commitment SPC = – 77, t = – 93)

Aside from the single exception we noted (i e , H_3), the results of this study support our predictions To test the generalizability of our findings, we conducted a second study that included service workers from a different environment the restaurant industry

Study 2

The food services industry differs from the financial services industry on several dimensions First, service is augmented by the presence of a tangible component (i e , food and drink) Second, the services provided are usually consumed at the service provider's location, consumers of financial services need not be present at the service provider's location to receive services Finally, most interactions in the food services industry are discrete rather than continuous transactions For these reasons, we believe that testing our hypotheses with a sample of restaurant employees provides a strong test of the generalizability of the results of Study 1

We collected data from workers employed in 12 restaurants of a fine-dining restaurant chain in the Midwest Using a list of all employees at each location, we randomly selected 20 employees from each restaurant, for a total of 240 distributed questionnaires Employees completed the self-report questionnaire during work hours, sealed it in an envelope, and returned it to a manager All respondents were assured of the confidentiality of their responses The questionnaire included our measures of CO, job satisfaction, organizational commitment, OCB-altruism, and contact time, in that order

We received 211 usable cases, of these, we identified 4 as problematic and removed them on the basis of casewise diagnostics (Cook and Weisberg 1982) Thus, the response rate for Study 2 was 87%, which is due in large part to the cooperation of restaurant chain management in offering extra break time to complete the questionnaire The majority of respondents were female (67%), median tenure at the restaurant was six months, and customer-contact time ranged from 0% to 100%, 76% of respondents reported spending at least 60% of their time with customers

Results

Model fit for the measurement model was good (χ^2 = 62 13, d f = 39, $p <$ 01, CFI = 98, TLI = 97, and RMSEA = 05), and all indicators loaded on the appropriate latent variables The measurement model provided evidence of the reliability, convergent validity, and discriminant validity of our measures Table 3 provides composite reliability, average variance extracted, and descriptive statistics for this sample

Structural model relationships Overall model fit was good (χ^2 = 62 14, d f = 40, CFI = 98, TLI = 98, and RMSEA = 05) The SPCs and associated t-values for all relationships in the structural model appear in Table 4

The results replicated those of Study 1 CO exerted positive influences on job satisfaction (SPC = 50, t = 6 67), organizational commitment (SPC = 43, t = 5 31), and OCB-altruism (SPC = 42, t = 5 53), which provides support for H_1, H_2, and H_5, respectively As we predicted in H_3, job satisfaction led to greater organizational commitment for the respondents (SPC = 36, t = 4 52) In addition, job satisfaction exerted a positive effect on OCB-altruism (i e , H_6 SPC = 44, t = 5 80)

Moderation tests We again split the sample into two groups on the basis of contact time (after we adjusted for the influence of CO) The low-contact group contained 101 members and the high-contact group contained 106 members The fully constrained model had χ^2 = 158 17 with d f = 105 As we hypothesized, the influence of CO on both job satisfaction and commitment was statistically stronger for the high-contact group than for the low-contact group (commitment $\Delta\chi^2$ = 4 47, Δd f = 1, $p <$ 05, high-contact-group SPC = 50, low-contact-group SPC = 29, satisfaction $\Delta\chi^2$ = 5 48, Δd f = 1, $p <$ 05, high-contact-group SPC = 59, low-contact-group SPC = 32), in support of H_4 The influence of CO on OCB-altruism did not differ across the two groups ($\Delta\chi^2$ = 00, d f = 1, $p >$ 10)

Follow-up tests Follow-up tests on the potential influences of SDR again led us to conclude that the factor cannot account for the obtained results Although SDR exerted significant influences on CO and commitment, the hypothesized relationships were still statistically significant (see Table 4) We then tested for the effect of common method variance As shown in Table 4, only three indicators loaded on the method factor (i e , COM2, COM3, OCB2), and the structural results were essentially unchanged

As was true for Study 1, the results indicate that CO is a determinant of both job satisfaction and organizational commitment, not vice versa (see Figure 2) For both job

TABLE 3
Study 2: Descriptive Statistics and Pairwise Correlations (Restaurant)

Variable	Mean	Standard Deviation	Composite Reliability	Average Variance Extracted	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) OCBs	5 17	1 24	91	77	1 00														
(2) CO	5 70	89	88	64	63	1 00													
(3) Satisfaction	5 52	1 20	92[a]	N A	65	50	1 00												
(4) Commitment	5 65	1 14	95	86	50	60	57	1 00											
Individual Indicators																			
(5) Pamper	5 63	1 04			55	90	45	53	1 00										
(6) Read	5 44	1 06			37	85	24	36	64	1 00									
(7) Deliver	6 20	95			40	82	37	53	69	58	1 00								
(8) Personal relationship	5 62	1 27			41	76	25	37	63	52	53	1 00							
(9) OCB1	4 98	1 45			91	51	55	40	53	38	38	40	1 00						
(10) OCB2	5 58	1 22			87	51	46	43	53	34	41	44	75	1 00					
(11) OCB3	4 95	1 56			86	36	45	34	40	25	27	25	64	58	1 00				
(12) COM1	5 56	1 42			35	49	45	87	47	38	47	30	31	34	28	1 00			
(13) COM2	5 66	1 20			39	47	44	90	48	27	50	34	38	37	29	63	1 00		
(14) COM3	5 72	1 20			44	48	47	92	48	30	46	37	39	44	34	67	81	1 00	
(15) SD	4 01	91			26	23	15*	26	26	15*	20	17*	21	27	21	16*	31	24	1 00

*$p <$ 05 (for all other correlations, $p <$ 01)

[a] Fixed path

Notes N A = not applicable

TABLE 4
Results of Structural Equations Analyses for Study 2 (Restaurant)

Structural Model Statistics	Results	Results with SDR	Methods Test Results
χ^2	62 14	72 14	42 83
d f	40	47	30
CFI	98	98	99
TLI	98	97	98
RMSEA	05	05	05

Path	Path Estimate	t-Value	Path Estimate	t-Value	Path Estimate	t-Value
CO → job satisfaction (H_1)	50	6 67***	49	6 16***	49	6 46***
CO → commitment (H_2)	43	5 31***	39	4 79***	46	5 40***
Job satisfaction → commitment	36	4 52***	35	4 47***	34	4 15***
CO → OCBs (H_4)	42	5 53***	39	5 06***	42	5 42***
Job satisfaction → OCBs (H_5)	44	5 80***	43	5 76***	43	5 50***
Social Desirability Effects						
SDR → CO			30	3 73***		
SDR → job satisfaction			04	49		
SDR → commitment			14	2 09**		
SDR → OCBs			10	1 58		
Measurement Paths						
Y1 (Pamper)	1 00	Fixed	1 00	Fixed	1 00	Fixed
Y2 (Read)	71	11 58	70	11 58	74	11 30
Y3 (Deliver)	77	13 26	77	13 27	77	13 25
Y4 (Personal relationship)	70	11 35	70	11 35	69	11 25
OCB1	1 00	Fixed	1 00	Fixed	1 00	Fixed
OCB2	90	14 33	90	14 38	89	13 74
OCB3	70	10 92	71	10 97	69	10 54
SAT	92	Fixed	92	Fixed	1 00	Fixed
COM1	1 00	Fixed	1 00	Fixed	1 00	Fixed
COM2	88	12 40	88	12 40	78	6 22
COM3	92	12 73	91	12 68	82	6 47
SD			91	Fixed		
Method Effects						
Method → personal relationship					1 00	Fixed
Method → deliver					07	74
Method → read					– 18	–1 38
Method → pamper					07	74
Method → COM1					– 09	– 50
Method → COM2					42	2 90***
Method → COM3					40	2 69***
Method → SAT1					10	81
Method → OCB1					15	1 41
Method → OCB2					19	1 91*
Method → OCB3					11	1 09

*p < 10
**p < 05
***p < 01

Notes n = 207 Standardized path estimates are shown The Study 2 results include (1) basic model only, (2) basic model with the addition of the social desirability effects, and (3) basic model with the results of a common method factor In a test of a common method factor, two models are compared one in which all the paths from the common method factor are fixed at zero and one in which the method factor is freed The common method factor results shown are from the freed model only As shown, only three relationships were affected by common method factor (i e , COM2, COM3, OCB2), however, the effects did not significantly affect the results of the hypothesized paths

responses, the path from CO to the response was statistically significant and positive (i e , job satisfaction SPC = 51, t = 2 91, organizational commitment SPC = 59, t = 3 63), whereas the path from the response to CO was nonsignificant (i e , job satisfaction SPC = – 02, t = – 07, organizational commitment SPC = 02, t = 08)

Although the results of Studies 1 and 2 are important and consistent with our predictions, our arguments for person–situation interactions depend heavily on the notion of a person's degree of fit with his or her job environment, a notion that we did not directly test A third field study enabled us to test the influence of CO on a direct measure of fit

Study 3

We propose that CO exerts a positive effect on job fit, which in turn influences commitment and job satisfaction We also expect that the influence of CO on job fit will be stronger for employees who have higher levels of customer-contact time Figure 3 shows the model we tested in Study 3

Method

We collected data from restaurant employees at a second restaurant chain in the Midwest All employees (n = 590) from 12 restaurant locations were given an opportunity to participate by completing a questionnaire with relevant measures and then returning it in a sealed envelope to company managers, who forwarded the questionnaires to us The questionnaire included measures for contact time, OCB-altruism, commitment, CO, and satisfaction, as well as a three-item measure of job fit that we developed for this study (e g , "My skills and abilities perfectly match what my job demands", see the Appendix) As we did previously, we assured all respondents of anonymity and the confidentiality of their responses As an incentive, two random respondents from each restaurant received $100 We obtained 257 usable questionnaires, for a 43% response rate We subsequently removed four cases on the basis of casewise diagnostics (Cook and Weisberg 1982) Of the respondents, 63% were female, median tenure at the restaurant was ten months, and customer-contact time ranged from 0% to 100%, 74% of respondents reported spending at least 60% of their time with customers

Results

The measurement model for the augmented model was good (χ^2 = 171 06, d f = 68, $p <$ 01, CFI = 95, TLI = 94, and RMSEA = 08), and all indicators loaded on the appropriate latent variables and exhibited acceptable measurement properties Table 5 presents descriptive statistics, composite reliabilities, and average variance extracted measures Table 6 includes the structural paths for the augmented model

Full mediation model To test the augmented model, we examined a full mediation model in which the effects of CO on job satisfaction and organizational commitment were fully mediated by job fit Overall model fit for this model was satisfactory (χ^2 = 191 35, d f = 72, $p <$ 01, CFI = 95, TLI = 93, and RMSEA = 08) As we expected, the path from CO to fit was positive and statistically significant (SPC = 64, t = 9 33), as were the paths from fit to satisfaction and commitment (satisfaction SPC = 56, t = 7 97, commitment SPC = 37, t = 4 43), a pattern of results that is consistent with a mediational role for job fit In addition, the effect of CO on OCB-altruism (SPC = 43, t = 6 45) and the effects of satisfaction on commitment (SPC = 23, t = 2 82)

FIGURE 3
Empirical Model: Study 3

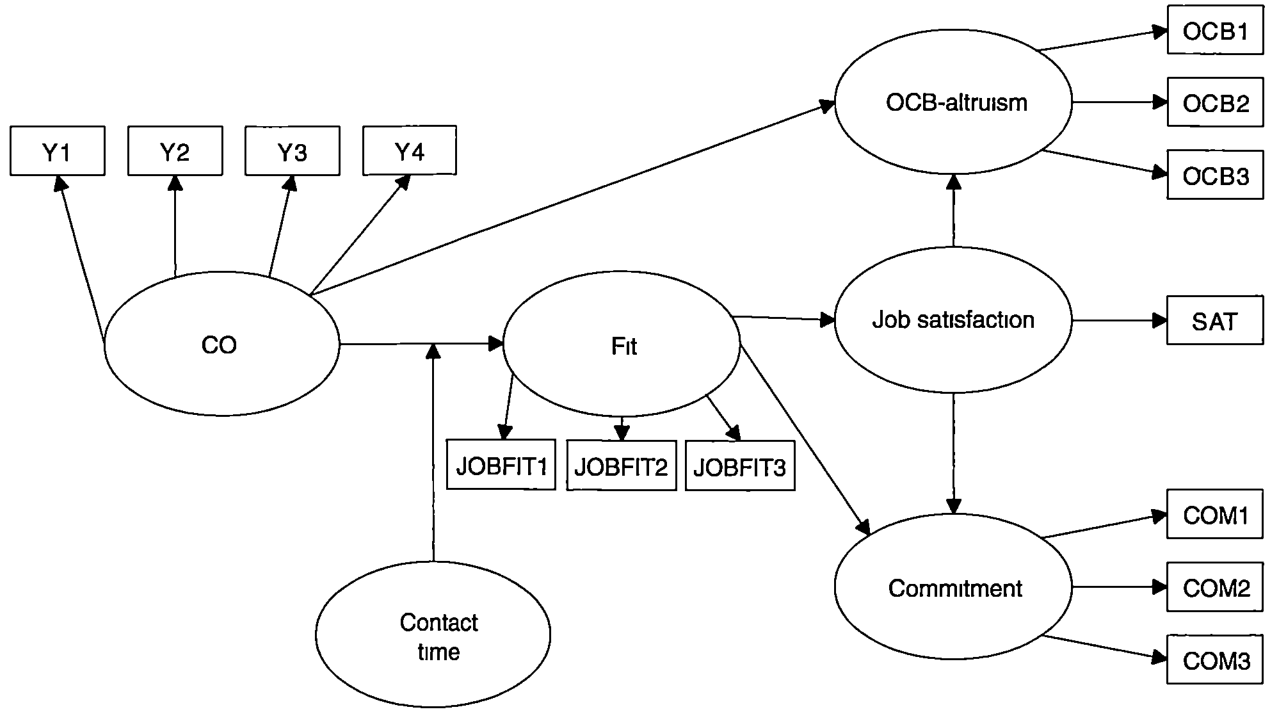


TABLE 5

Study 3: Descriptive Statistics and Pairwise Correlations (Restaurant)

Variable	Mean	Standard Deviation	Composite Reliability	Average Variance Extracted	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
(1) OCBs	7 41	1 32	91	77	1 00																	
(2) CO	6 53	1 61	89	68	51	1 00																
(3) Satisfaction	5 54	1 15	92[a]	N A	36	37	1 00															
(4) Commitment	6 03	1 89	93	83	41	49	43	1 00														
(5) Fit	6 50	1 72	94	83	37	63	56	47	1 00													
Individual Indicators																						
(6) Pamper	6 43	1 83			46	90	33	44	58	1 00												
(7) Read	6 38	1 85			38	90	25	34	45	80	1 00											
(8) Deliver	7 05	1 65			42	83	28	38	47	72	68	1 00										
(9) Personal relationship	6 24	2 19			25	82	26	36	32	62	62	52	1 00									
(10) OCB1	7 20	1 62			86	35	32	39	33	35	32	32	23	1 00								
(11) OCB2	7 53	1 37			91	40	31	31	34	43	34	43	21	63	1 00							
(12) OCB3	7 50	1 46			91	41	27	33	27	47	36	39	22	63	84	1 00						
(13) COM1	5 87	2 08			30	35	26	87	29	34	27	32	28	32	22	26	1 00					
(14) COM2	6 25	1 99			41	42	37	92	40	45	32	38	31	39	33	36	74	1 00				
(15) COM3	5 98	2 31			32	40	38	88	37	39	33	31	36	34	26	25	59	72	1 00			
(16) Fit1	6 69	1 94			29	43	28	26	87	45	38	41	25	27	30	22	18	28	23	1 00		
(17) Fit2	6 20	1 96			27	48	47	35	89	54	43	36	34	25	25	22	23	34	36	64	1 00	
(18) Fit3	6 62	1 89			37	49	48	44	91	55	39	49	27	35	34	29	36	44	38	69	74	1 00

[a]Fixed path

Notes For all correlations, $p <$ 01 (two-tailed) N A = not applicable

TABLE 6
Results of Structural Equations Analyses for Study 3 (Restaurant)

Structural Model Statistics	Full Mediation Model	Partial Mediation Model
χ^2	191 35	176 03
d f	72	70
CFI	95	95
TLI	93	94
RMSEA	08	08

Path	Path Estimate	t-Value	Path Estimate	t-Value
CO → job satisfaction			04	42
CO → commitment			31	3 85*
Job satisfaction → commitment	23	2 82*	24	3 03*
CO → OCBs	43	6 45*	44	6 50*
Job satisfaction → OCBs	20	3 00*	20	2 93*
CO → fit	64	9 33*	63	9 16*
Fit → job satisfaction	56	7 97*	54	5 87*
Fit → commitment	37	4 43*	15	1 54
Measurement Paths				
Y1 (Pamper)	1 00	Fixed	1 00	Fixed
Y2 (Read)	86	19 66	86	19 66
Y3 (Deliver)	76	15 50	76	15 54
Y4 (Personal relationship)	66	12 41	66	12 46
OCB1	1 00	Fixed	1 00	Fixed
OCB2	69	12 87	69	12 89
OCB3	92	18 92	92	18 99
SAT	92	Fixed	92	Fixed
COM1	1 00	Fixed	1 00	Fixed
COM2	94	14 53	94	14 68
COM3	77	12 85	77	12 88
JOBFIT1	1 00	Fixed	1 00	Fixed
JOBFIT2	83	13 16	83	13 28
JOBFIT3	90	13 97	90	14 00

*$p < 01$
Notes n = 253, standardized path estimates are shown

and OCB-altruism (SPC = 20, t = 3 00) were statistically significant[5]

Using the same procedures applied in the previous studies, we split the sample into low-contact (n = 123) and high-contact (n = 130) groups A two-group analysis indicated that the influence of CO on job fit was stronger for high-contact employees (SPC = 80) than for low-contact employees (SPC = 50) ($\Delta\chi^2 = 11\ 43$, d f = 1, $p < 01$), which is consistent with our expectations

Partial mediation model Despite the strength of these results, comparison of the fully mediated model with a model that also included direct links from CO to satisfaction and commitment was required to better understand the role of job fit Thus, we estimated a partial mediation model that allowed for direct effects of CO on these job responses in addition to the effects mediated through job fit The results are presented in Table 6 The overall fit of the model was better ($\chi^2 = 176\ 03$, d f = 70, $p < 01$, CFI = 95, TLI = 94, and RMSEA = 08), addition of the direct links significantly improved the model ($\Delta\chi^2 = 15\ 32$, d f = 2, $p < 01$) The direct link between CO and satisfaction was nonsignificant (SPC = 04, t = 42, $p > 10$), an indication that the effect of CO on satisfaction was fully mediated by job fit The moderating effect of contact time on the relationship between CO and job fit remains from the full mediation model ($\Delta\chi^2 = 10\ 86$, d f = 1, $p < 01$) Thus, it appears that CO is related to job satisfaction, but only because greater CO leads to greater job fit, especially for high-customer-contact employees

The influence of CO on commitment to the organization is more complex The direct link between CO and commitment in the partial mediation model was statistically significant (SPC = 31, t = 3 85), but the link from job fit to commitment became nonsignificant (SPC = 15, t = 1 54, $p > 10$) Apparently, the positive influence of service-worker CO on commitment has little to do with job fit, though there remains a smaller effect mediated by the influence of job fit on satisfaction, which in turn influences commitment The degree of customer-contact time moderates the direct relationship between CO and commitment (high contact SPC = 46, low contact SPC = 22, $\Delta\chi^2 = 5\ 94$, d f = 1, $p < 05$), which is consistent with Studies 1 and 2

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[5] We also tested the model in Study 3 using Brown and colleagues' (2002) measure of CO The results were similar to those found in this study The fit indexes from the model using Brown and colleagues' scale were as follows $\chi^2 = 101\ 06$, d f = 49, $p < 01$, CFI = 97, TLI = 96, and RMSEA = 07 All path relationships were significant as well

Discussion

The results reveal that in addition to CO's effect on performance, it has strong effects on several employee job responses (e g , Brown et al 2002, Hurley 1998, Saxe and Weitz 1982) Managers must understand the factors that will keep their high performers satisfied, committed, and on the job Our results, obtained across three studies in two different services industries, reveal that CO positively influences job satisfaction, commitment, and the performance of OCB-altruism The outcomes are largely internal to the organization, but they are important for the motivational well-being of the service worker (i e , satisfaction and commitment) and successful day-to-day operation of the services organization (i e , OCB-altruism) The results suggest that service-worker CO plays a much greater role in services organizations than has been understood

Our results reveal that employees who have higher levels of CO especially thrive in services settings that allow for a high degree of contact time with customers As we predicted, CO (a personal variable) and contact time (a situational variable) interact to predict job satisfaction and commitment, CO has a stronger influence on the job responses of workers who have higher levels of contact time Thus, our research establishes boundaries on the influence of CO on job responses Although even low-contact employees experienced some satisfaction and commitment associated with CO, high-contact employees consistently experienced significantly stronger effects of CO on satisfaction and commitment Thus, a firm's employing highly customer-oriented people does not necessarily produce the most satisfied and committed employees, the job environment (in this case, degree of customer contact) must also be taken into account

Even though services managers may understand that it takes a certain kind of employee to flourish in customer-contact positions, our research provides an understanding of why these employees do flourish In our conceptualization, the employees have an internal drive to (1) pamper customers, (2) accurately read customers' needs, (3) develop a personal relationship with customers, and (4) deliver quality service to solve customers' problems Employment in services industries enables workers to satisfy these needs in the process of performing their jobs The measure developed herein has the potential for use in hiring (and/or training) customer-contact employees The measure may also be employed in academic research that addresses service workers However, additional studies that test the measure's construct and predictive validity are required, particularly before they are employed for employee selection

Another contribution of our research is the delineation of the process through which CO affects overall job satisfaction The results of Study 3 support the hypothesis that the effects of CO on job satisfaction are mediated by the perceived degree of job fit We believe that the failure of job fit to mediate the influence of CO on organizational commitment is intriguing By taking a narrow perspective on job fit (i e , we focused on the degree of match between job demands and the worker's skills and abilities), we may not have assessed the kind of fit that is important for the development of commitment Satisfaction with a particular job or set of tasks is one thing, commitment to a larger entity is something else, and further research should investigate this issue

An additional contribution of our research is the determination of the directionality of causal relationships between CO and job responses In contrast to assertions by prior researchers (i e , Hoffman and Ingram 1991, 1992, Kelley 1992, Pettijohn, Pettijohn, and Taylor 2002), our results suggest an antecedent role for CO Although customer-oriented performance may be influenced by job satisfaction and commitment, our results support the hypothesis that satisfaction and commitment result from CO rather than cause it

Managerial Implications

The finding that CO is an antecedent to job satisfaction and commitment holds important implications for services managers who are charged with recruiting new employees First, even though employees may have similar training and experience, not all prospective employees will react and perform equivalently in the same position In addition to performing better on the job (Brown et al 2002, Saxe and Weitz 1982), service workers who possess higher levels of CO can be expected to respond more favorably to the job than can service workers who have lower levels of CO Second, because CO leads to job satisfaction and commitment, managers must recruit with this personality trait in mind, and they should not expect that CO will simply develop over time in response to job satisfaction and commitment Our studies are the first to examine the causal ordering of these constructs

The findings also have implications for the management of people and work tasks in the services organization Perhaps most obvious is the suggestion that customer-oriented workers will find the greatest level of satisfaction and commitment when placed in high-customer-contact positions When they are placed in low-contact positions, the internal drive to satisfy customer needs has much less effect on their job satisfaction and commitment to the organization Of greater concern, perhaps, is the placement of a worker who has a lower degree of CO in a high-contact position The resulting lower levels of satisfaction and commitment will be magnified as a result of the high-contact environment The same worker in a low-contact position should experience less reduction in satisfaction and commitment as a result of low levels of CO Thus, managers who fail to consider adequately the degree of CO of their workers may miss an important non-salary-based driver of satisfaction and commitment Services managers might also reconsider the organization of job tasks such that highly customer-oriented workers are allowed to spend the maximum amount of time possible in contact with customers It may be possible, and ultimately profitable, to shift non-customer-contact tasks to other workers in the organization to capture fully the value of the most customer-oriented employees

We also offer a word of caution about the common practice in services organizations of moving the better line performers into supervisory positions Given the role that CO may play in driving performance, satisfaction, commitment, and OCB-altruism, in some cases it may be counterproductive for the organization and for the individual worker to move from a high-contact line position to a position that has less direct customer interaction Services marketing managers must consider that job satisfaction previously obtained by these workers from customer contact may need to be provided in other channels

On a more macro level, the proliferation of self-service technologies (e g , telephone banking, automated hotel checkout, Meuter et al 2000) may limit the overall availability of services jobs that are best suited for high-CO workers Although research thus far has been limited to consumers of such technologies (e g , Dabholkar and Bagozzi 2002), the job responses of workers whose jobs have been modified (or eliminated) as a result should be considered

Limitations and Directions for Further Research

A limitation of our research is that we investigated only overall job satisfaction Further research should determine whether CO has the same impact across various dimensions of job satisfaction Similarly, we investigated only one aspect of the situational environment degree of contact time Further research should investigate other potentially important aspects of the situation, such as perceived market orientation of the organization, availability of resources necessary to meet customer needs, and employees' perception of managerial fairness in dealing with on-the-job issues In addition, as we noted previously, further studies should clarify the type of fit that may affect commitment

A limitation that additional research should investigate is the possibility that a personality trait such as materialism or altruism influences the relationship between CO and OCB-altruism Furthermore, although previous research demonstrates that basic personality traits predicted CO, only a small portion of the variance was captured Another variable such as benevolence may drive the CO measure and might account for a larger portion of the variance

Our studies may also be limited by the samples we obtained The samples were predominately made up of women (i e , 81%, 67%, and 63%, respectively, in Studies 1, 2, and 3), and the mean tenures were low, at 19 months, 6 months, and 10 months, respectively Additional studies might investigate a more diverse workforce and longer tenures to determine whether the same relationships hold

Another important area for further research involves identifying and testing CO determinants For example, researchers should determine the degree to which training in the organization has a long-term effect on service-worker CO If researchers find that training can influence CO, the potential outcomes for a service organization (e g , enhanced service performance, job satisfaction, organizational commitment, performance of OCBs) are quite positive In addition, the nature of the hierarchical personality model that underlies CO should be more fully investigated

Regardless of whether training can influence CO, we believe that service managers must attend to the CO of potential employees during the hiring process More research is necessary to develop an employee selection instrument that effectively identifies candidates who will flourish over the long run in customer-contact positions Such an instrument might also help companies identify employees who have a mismatch with their position Should a mismatch occur, it might be possible to change the employee's job Even if the situation cannot be immediately remedied, recognizing such mismatches of individual and job might provide the insight necessary for the person to adjust to the stress and dissatisfaction that may result (e g , Singh, Verbeke, and Rhoads 1996)

In summary, researchers have made significant progress toward understanding the role of CO, particularly as it pertains to employee job performance The results of this project suggest that the benefits of employing customer-oriented service workers go well beyond improving performance to enhancing other factors that are important to the welfare of employees and the organization job satisfaction, commitment, and organizational citizenship

Appendix
Measures Used in Analysis

Contact Time with Customers (11-point scale ranging from 0% to 100%)

What proportion of your time do you spend in contact with customers?

Customer Orientation

Need to Pamper Dimension (7-point "strongly disagree–strongly agree" scale) (Y1 in Figure 1)

I enjoy nurturing my service customers

I take pleasure in making every customer feel like he/she is the only customer

Every customer's problem is important to me

I thrive on giving individual attention to each customer

Need to Read Customer's Needs Dimension (7-point "strongly disagree–strongly agree" scale) (Y2)

I naturally read the customer to identify his/her needs

I generally know what service customers want before they ask

I enjoy anticipating the needs of service customers

I am inclined to read the service customer's body language to determine how much interaction to give

Need to Deliver Dimension (7-point "strongly disagree–strongly agree" scale) (Y3)

I enjoy delivering the intended services on time

I find a great deal of satisfaction in completing tasks precisely for customers

I enjoy having the confidence to provide good service

Need for Personal Relationship Dimension (7-point "strongly disagree–strongly agree" scale) (Y4)

I enjoy remembering my customers' names

I enjoy getting to know my customers personally

Organizational Commitment (7-point "strongly disagree–strongly agree" scale)

The relationship my firm has with me is

- something to which I am very committed (COM1)
- is very important to me (COM2)
- is very much like being family (COM3)

Job Satisfaction (7-point, "very dissatisfied–very satisfied" scale)

How satisfied are you with your overall job? (SAT)

Organizational Citizenship Behaviors (Altruism) (7-point "strongly disagree–strongly agree" scale; 9-point scale used in Study 3)

I help orient new employees even though it is not required (OCB1)
I always lend a helping hand to others on the job (OCB2)
I willingly give time to help other employees (OCB3)

Socially Desirable Responding (Studies 1 and 2 only) (6-point, "strongly disagree–strongly agree" scale)

There have been occasions when I took advantage of someone
I sometimes try to get even rather than forgive and forget
At times I have really insisted on having things my own way
I like to gossip at times
I have never deliberately said something that hurt someone's feelings
I'm always willing to admit it when I make a mistake
(Items 1–4 collected in Study 1, all 6 items collected in Study 2)

Job Fit (Study 3 Only) (9-Point, "strongly disagree–strongly agree" scale)

My skills and abilities perfectly match what my job demands (FIT1)
My personal likes and dislikes match perfectly what my job demands (FIT2)
There is a good fit between my job and me (FIT3)

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Kusum L. Ailawadi & Bari Harlam

An Empirical Analysis of the Determinants of Retail Margins: The Role of Store-Brand Share

The authors develop and test a model of the key determinants of margins that retailers earn on national brands and store brands. They particularly focus on the impact of store-brand share on percentage margin, dollar margin per unit, and total dollar margin of the retailer. The authors find not only that percentage retail margins on store brands are higher than on national brands but also that high store-brand share enables retailers to earn higher percentage margins on national brands. However, the dollar margin per unit may be smaller for store brands because of their lower retail price. Furthermore, heavy store-brand users contribute much less to the total dollar profit of the retailer than do light store-brand users. The authors conclude that it is important for retailers to retain a balance between store brands and national brands to attract and retain the most profitable customers.

During the past decade, retail profit margins in the packaged goods industry have been the subject of substantial discussion and research. On the one hand, much has been written about the increasing power of retailers and their proclivity to negotiate lower wholesale prices and higher trade allowances from manufacturers (e.g., Alpert, Kamins, and Graham 1992; Buzzell, Quelch, and Salmon 1990; Harrison 1999a, b). On the other hand, there is growing evidence that aggregate retail profit margins do not support the purported shift in power. Retail industry margins are either shrinking or remaining steady (Farris and Ailawadi 1992; Messinger and Narasimhan 1995).

A major topic at the center of much of the discussion about retailer power and profitability relative to that of manufacturers is the growth of store brands, for which average U.S. market share was up from 15.3% in 1988 to 20% in 1998 (Dunne and Narasimhan 1999; *Marketing News* 1995). In a survey of retailers, Cannondale Associates (1996) found that more than 70% of retailers considered store-brand growth an important issue (Wellman 1997). In a *Discount Merchandiser* (1996) survey, retailers rated "better profit margins" as the most important reason for carrying store brands. No wonder that several U.S. retailers now sell store brands in many product categories. In addition, researchers have provided both theoretical and empirical insights about when store brands should be introduced (e.g., Raju, Sethuraman, and Dhar 1995) and about the determinants of store-brand share across categories and retailers (e.g., Dhar and Hoch 1997; Hoch and Banerji 1993).

Despite all the interest in retail profitability, little is known about either the determinants of retail margins across product categories or the specific relationship between store-brand share and retail margins after a store brand has been introduced. The purpose of this article is to fill the gap in the literature by conducting a systematic empirical examination of the determinants of margins retailers earn on national brands and store brands and of the impact of store-brand share on these margins.

We address three specific clusters of research questions. First, what are the key determinants of retail margins across product categories? How do factors such as manufacturer concentration, advertising, and distribution affect retail margins on national and store brands? When these factors are accounted for, do retailers earn higher percentage margins on national brands in categories in which they have strong store-brand share than in categories in which their store-brand share is weak? Second, although it is well known that retailers earn higher percentage gross margins on store brands than on national brands, how and why does this margin differential vary across product categories? Does the differential hold up when considering percentage contribution margins net of the direct product costs retailers incur and when considering dollar rather than percentage margins? Third, how does store-brand share affect the retailer's total dollar profit? Do consumers who are heavy users of store brands contribute more or less than light users or nonusers of store brands to the total profit of the retailer? To answer these questions, we use sales, share, and profit margin data from two major retail chains that are supplemented with category characteristics from other sources.

The article is organized as follows. We provide the motivation for our work by reviewing prior research that is

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relevant to each of our research questions, and we show why the answers are not obvious We then describe the data used in our analysis and subsequently address our research questions We develop and estimate a model, including key determinants such as advertising, distribution, and store-brand share, of the gross and net margins that retailers earn on national brands and store brands We then compare retail percentage and dollar margins on store brands and national brands across several product categories We explore the relationship of store-brand share to total retail profit by comparing the average dollar profit that retailers obtain from customers who are nonusers, light users, and heavy users of store brands We conclude with a discussion of our findings and implications for further research

Literature Review and Motivation for Research

Determinants of Percentage Retail Margins

According to basic industrial organization theory, the margin that a market player can earn is a function of the player's market power In the context of the packaged goods industry, the relative market power of retailers versus manufacturers determines how total channel profit is split between the two and the margins that retailers can earn (e g , Kadiyali, Chintagunta, and Vilcassim 2000) In turn, the relative market power of retailers versus manufacturers is influenced by several key variables, such as national brand concentration, advertising spending, distribution, and store-brand share, all of which vary across product categories As a result, retail margins also vary significantly across categories The literature contains some important conceptual and analytical work on the inverse relationship between manufacturer and retail margins and on the role of advertising and distribution in the relationship (Abela and Farris 1999, Albion and Farris 1981, 1987, Lal and Narasimhan 1996, Steiner 1973, 1978, 1993) In recent years, researchers have also developed structural models of optimal retailer pricing from first principles of profit maximization (e g , Besanko, Gupta, and Jain 1998, Chintagunta, Bonfrer, and Song 2002, Kadiyali, Chintagunta, and Vilcassim 2000) This stream of research provides a useful and flexible way to describe the type of pricing game played by a retailer and a few national brand manufacturers in a single category However, we are not aware of any comprehensive empirical analysis of factors explaining cross-category variations in retail margins on national brands and store brands Such a study would complement Shankar and Bolton's (2003) analysis of the variation in retailer pricing strategies across brands, categories, stores, and markets

There is much discussion in the theoretical literature about a determinant of retail margins that is of particular interest in our research store-brand share In general, researchers agree that introducing a store brand can enable retailers to obtain lower wholesale prices from national brand manufacturers and therefore earn higher margins on national brands However, there is disagreement about the relationship between store-brand share and the retailer's margin on national brands after the store brand has been introduced On the one hand, Mills (1995) predicts that the higher the market share of the store brand, the lower is the wholesale price of national brands and therefore the higher is the margin that the retailer can obtain on national brands On the other hand, Narasimhan and Wilcox (1998) predict a negative relationship between store-brand share and the retailer's margin on national brands They distinguish between the exercised and unexercised threat of a store brand and argue that the retailer's ability to extract channel profit lies in the market share that the store brand can potentially attain, not in its actual market share Morton and Zettelmeyer (2000) make a similar argument They do not expect that store-brand market share is necessarily related to retail margins from national brands

Despite the divergent theoretical predictions, empirical evidence of the relationship between store-brand share and retail margins is scarce Narasimhan and Wilcox (1998) provide some empirical results, but their analysis has some important limitations that must be overcome First, their analysis is based on aggregate data across retailers that are likely to be heterogeneous in many aspects that determine their store-brand success and their bargaining ability with national brands Second, their analysis does not use actual margin data from specific retailers, instead, it uses estimates of average retail margins from consumer expenditure survey data and does not separate store-brand and national-brand margins Third, it uses penetration of store brands rather than of market share, but penetration is just one component of share (Ailawadi, Lehmann, and Neslin 2001) Finally, their analysis omits several key determinants of store-brand share and margin Thus, it is not clear whether high store-brand share increases retail margins on national brands or whether it is better to have a store brand on the shelf as an unexercised threat

We develop an econometric model of a retailer's margin on national and store brands, which we estimate using data from individual retail chains Because retailers may put more effort into store brands in categories with higher margins or may deliberately raise their national-brand prices and thus their national-brand margins to increase store-brand share, there may be reverse causality between retail margins and store-brand share We control for this reverse causality

The Store Brand–National Brand Margin Differential

In general, it is known that retailers earn higher percentage gross margins on store brands than on national brands (e g , Handy 1985, Hoch and Banerji 1993), this primarily is because private label suppliers have little market power, in contrast with national brands Private label suppliers operate in a competitive market with no product differentiation and thus sell to retailers at a price that is close to their marginal cost In addition, manufacturers' advertising costs are high for national brands, and these costs are reflected in higher wholesale prices of the brands In addition, a retailer has somewhat of a local monopoly on its store brand because competing retailers do not carry the same store brand, though they do carry the same national brands

However, some questions about the store brand–national brand margin differential remain unanswered First, gross and net contribution margins are often not highly correlated in practice (Borin and Farris 1990), yet there is little evidence about the difference in net margins between store brands and national brands when the retailer's direct product costs are taken into account The single exception that we know of is Corstjens and Lal's (2000) description of a Canadian retailer's beverage category, which suggests that net percentage retail margins on store brands can be lower than on national brands We therefore compare not only gross margins but also net contribution margins that retailers earn on national and store brands

Second, the percentage margin differential is certainly not equal across all categories, but we are not aware of any work that examines how and why this differential varies across categories We therefore use our cross-category determinants of retail margins on national brands and store brands to explain variations in the store brand–national brand margin differential

Third, attention has been focused on percentage margins, probably because they can be readily compared across categories, but retailers should be concerned at least as much with dollar margins Even if retail percentage margins are higher for store brands than for national brands, corresponding dollar margins may not be Retailers pay lower wholesale prices for store brands, but store brands are sold at significantly lower retail prices than national brands are If the higher percentage margin on store brands does not offset the lower retail price, dollar margin per unit may be lower for store brands than for national brands This may be particularly true in the face of increasing store-brand competition, not just in the grocery channel but also in the mass-merchandiser and drugstore channels (Johnson 1994, Matthews 1995) Therefore, we also compare dollar margins from store brands and national brands

The Profitability of Store-Brand Users

Retailers should also be concerned with total dollar margin in the store How much do heavy store-brand users, compared with light or nonusers, contribute to the total dollar margin of the retailer? Even if the retailer's dollar margin per unit is higher from store brands, the total profitability of a heavy store-brand user depends on how many items and which other items he or she buys from the retailer

Several researchers have suggested that store brands are associated with better store image and higher store loyalty (Ailawadi, Neslin, and Gedenk 2001, Corstjens and Lal 2000, Steenkamp and Dekimpe 1997), which would have a positive effect on retail sales and total dollar margin because loyal consumers buy a larger share of their total grocery requirements from the store However, it may also be that heavy users of store brands are loyal to store brands in general, not necessarily to the store brand of a particular retailer Furthermore, if store brands attract budget-constrained, price-conscious, or deal-prone consumers whose market baskets are small or contain other low-margin/loss-leader products, store-brand users may contribute less than nonusers do to the total dollar profit of the retailer (e g , Quelch and Harding 1996) Although the demographic and psychographic correlates of store-brand proneness have been studied (Ailawadi, Neslin, and Gedenk 2001, Richardson, Jain, and Dick 1996), we are not aware of any research that examines store-brand users' profitability We explore this issue by comparing the total profitability of heavy store-brand users with that of light store-brand users and nonusers

Data

We used data from two anonymous retail chains and conducted all our analyses for each retailer separately This provided a valuable validation test for our results, especially because the two retailers differ in many respects One is a grocery retail chain and the other is a drug retail chain, one practices everyday low pricing and the other practices high–low pricing There are also some differences in the type of data from the two retailers

The first data set (Retailer 1) consists of point-of-sale market-basket data from 20 stores that belong to a major grocery retail chain The data include sales, price, and profit information on all items in every market basket purchased during a four-week period in 1998 The data result in records for items from 291 product categories bought in 801,821 market baskets Of the product categories, 123 are in the produce, meats, deli, seafood, and bakery departments, in which most products are unbranded and not categorized into store and national brands Of the remaining 168 product categories, which are in the grocery, general merchandise, dairy, specialty, frozen foods, and health/beauty/cosmetics (HBC) departments, 115 have a store brand The average market share of the store brand is 22%, which is in line with the national average store-brand share of about 20% (Dunne and Narasimhan 1999) The profit data from Retailer 1 include both gross margin (after promotional allowances linked to a specific product are accounted for) and net contribution margin (after direct product costs incurred by the retailer, including receiving, stocking, packaging, cashiering, bagging, and so on, are subtracted) of every item in every market basket However, the data are organized at the market-basket level, not at the panel level, so we cannot assign baskets to individual households Because pricing and retail margins differ across the 20 stores, we conducted our analysis at the store level for Retailer 1

To study the determinants of retail margins, we combined the sales, price, and profit variables we obtained from the market-basket data with category penetration, average purchase cycle, and promotion activity from the *Marketing Fact Book* (Information Resources Inc 1998), category advertising data from Leading National Advertisers' class/brand summary, store-brand quality data collected by Hoch and Banerji (1993) and Sethuraman and Cole (1997), and distribution data collected in our own survey of stores that belong to competing grocery, drug, and mass-merchandiser chains

The second data set (Retailer 2) is based on purchase data from the drug retailer's customer panel for all the stores in a market during a six-month period in 2000 The data include price and gross margin for each item purchased by the panel members in every shopping trip and contain records for 41,335 customers who made a total of 347,214 shopping trips The total number of categories is 118, and the retailer offers a store brand in 70 categories The average store-brand market share is approximately 23% As does Retailer 1, Retailer 2 also has a store brand in the majority of categories, and the store-brand share is consistent with levels reported in previous research The stores in this data set are all in a single pricing zone with identical prices and margin, so we aggregated data across stores for our analysis

The profit data from Retailer 2 include gross margin of every item in every market basket We do not have net contribution margin in this case However, the data are organized at the panel level, so we were able to evaluate the profitability of a customer, not just the profitability of a market basket We also calculated category penetration, average purchase cycle, and percentage sold on promotion from the panel data Table 1 lists all the variables we used in our study as well as their definitions and the sources from which we obtained them

The Effect of Store Brands on National-Brand Margins

Model Development and Hypotheses

The determinants of retail margins can be grouped into three sets variables that reflect (1) manufacturer market power, (2) retailer market power, and (3) consumer and category characteristics An overarching theme that underlies our hypotheses, especially for the first two sets of variables, is the relationship of market power to margins and the inverse relationship between manufacturer and retail margins (Steiner 1993) In brief, as the manufacturer's consumer franchise and market power increase, wholesale prices and manufacturer margins increase However, retailers cannot increase prices on the products with a strong consumer franchise because consumers may switch stores to buy their preferred brand at a better price As a result, retail margins decrease In contrast, if consumers are more likely to switch brands within a store than to switch stores, retail market power increases, wholesale prices are negotiated down, and manufacturer margins decrease However, lower retail competition reduces the downward pressure on retail prices, and retail margins increase as a result

We discuss the individual variables in our model and our expectations about their effect on retailers' gross and net contribution margins from national and store brands Note that we expect that only the variables that influence direct product costs will have significantly different effects on gross margins than on net contribution margins Table 2 summarizes our hypotheses about all the variables in the model, in the order that we discuss them subsequently

Manufacturer market power As the concentration of national-brand manufacturers increases, their market power also increases (Scherer and Ross 1990) Therefore, we expect retailers to take lower margins on national brands in categories in which the Herfindahl index, a standard measure of concentration, is high Furthermore, because higher manufacturer power leads not only to higher wholesale prices but also to lower retail prices for national brands, retailers must reduce prices on store brands to preserve a sufficient price differential with national brands Therefore, we expect retailers also to take lower margins on store brands as the Herfindahl index increases

Beginning with the pioneering work of Steiner (1973, 1978), researchers have shown that national brands that manufacturers advertise heavily are sold at higher wholesale prices and lower retail margins than are less advertised brands (Albion and Farris 1981, 1987, Lal and Narasimhan 1996, Steiner 1993) This phenomenon is because advertising decreases consumers' propensity to switch to another brand within the store and increases their propensity to switch stores for their preferred brand, thus giving the manufacturer leverage over retailers If the same phenomenon applies across product categories, we expect retailers to take lower margins on national brands in heavily advertised categories To compete effectively in categories with high consumer pull for national brands, we expect retailers to take lower margins on store brands as well We also expect both national brands and store brands to be sold at lower retail margins in heavily promoted categories because retailers must price more competitively in such categories (Gerstner, Hess, and Holthausen 1994, Steiner 1984)

Finally, because there is no reason to believe that any of the manufacturer power–related variables affect direct product costs, we expect them to have similar effects on gross and net contribution margins

Retailer market power The greater the number of retailers who distribute the category, the greater is the competition between retailers and the lower is their market power As a result, there will be greater pressure on retailers to keep their national brand prices competitive (Shankar and Bolton 2003) Therefore, we expect retail margins on national brands to be lower for categories that are widely distributed at competing chains As the number of competing retailers that distribute a store brand in the category increases, the competition among retailers should also increase and put downward pressure on retail prices and margins However, there is also a counterargument that store brands engender store loyalty and therefore give retailers some monopoly power because competing retailers do not carry the same store brand This may soften store-brand price competition among retailers and enable retailers to take higher margins on store brands We expect that wider store-brand distribution will make retailers compete more aggressively on store-brand prices, leading to a negative relationship between store-brand distribution and retail margins on both store brands and national brands

Because store brands provide a means of differentiation and thus market power for retailers, retailers should be able to negotiate lower prices from manufacturers and earn higher margins in categories with a strong store-brand threat (Mills 1995, Morton and Zettelmeyer 2000, Narasimhan and Wilcox 1998) As we noted previously, some researchers have argued that a store brand can be a credible threat even if its share is low However, we hypothesize that national-brand retail margins are higher in categories in which store-brand share is high because we believe high share is definitely a threat whereas low share may not be a credible threat We also expect that store-brand margins are higher in categories with high store-brand share because

TABLE 1
Definitions of Variables Used in Empirical Analysis

Variable	Definition	Source for Retailer 1	Source for Retailer 2
Percentage gross margin	$\frac{\text{Net selling price} - \text{cost from vendor}}{\text{Net selling price}}$	Retailer POS data	Retailer panel data
Percentage net contribution margin	$\frac{\text{Net selling price} - \text{cost from vendor} - \text{direct product cost}}{\text{Net selling price}}$	Retailer POS data	Retailer panel data
Percentage margin for national brands	$\sum_k \left(\frac{\text{\$ Sales of national brand manufacturer k}}{\text{Total \$ sales of product category}}\right)(\text{\% margin of manufacturer k})$	Retailer POS data	Retailer panel data
Dollar gross margin	Net selling price – cost from vendor	Retailer POS data	Retailer panel data
Dollar net contribution margin	Net selling price – cost from vendor – direct product cost	Retailer POS data	Retailer panel data
Dollar margin for national brands	Median value of dollar margin for national brands	Retailer POS data	Retailer panel data
Herfindahl index (Herfind)	Sum of squared market shares of all manufacturers in the category	Retailer POS data	Retailer panel data
Advertising (Advtg)	Media advertising for product category (millions of dollars)	Leading National Advertisers' class/brand summary	
Deal frequency (Deal)	Percentage of all sales of the category made on some type of deal	Information Resources Inc (1998)	Retailer panel data
Deal depth (Depth)	Average percentage discount when the category is on some type of deal	Information Resources Inc (1998)	Retailer panel data
Category distribution (Catdist)	Percentage of major grocery, drug, and mass-merchandise chains in the relevant geographical area that carry the product category	Primary data (2002)	
Store-brand distribution (Sbdist)	Percentage of major grocery, drug, and mass-merchandise chains in the relevant geographical area that carry a store brand in the category	Primary data (2002)	
Store-brand share (Sbshare)	$\frac{\text{Dollar sales of store brand}}{\text{Total dollar sales of product category}}$	Retailer POS data	Retailer panel data
Category elasticity (Catelast)	Average percentage increase in category sales due to a 15% price cut	Narasimhan, Neslin, and Sen (1996), *P-O-P Times* (1991)	

TABLE 1
Continued

Variable	Definition	Source for Retailer 1	Source for Retailer 2
Penetration (Penet)	Percentage of households that buy the category	Information Resources Inc (1998)	Retailer panel data
Average purchase amount (Puramt)	Average dollar amount of purchase when category is purchased (i e , price per unit × number of units purchased)	Retailer POS data	Retailer panel data
Average purchase cycle (Purcycle)	Average number of days between consecutive purchases of the category	Information Resources Inc (1998)	Retailer panel data
Perishable product dummy (Perish)	Equal to 1 if the category is perishable (i e , frozen, refrigerated, or dairy foods), equal to 0 otherwise	Retailer POS data	Retailer panel data
HBC dummy (HBC)	Equal to 1 if the category is in the HBC department, equal to 0 otherwise	Retailer POS data	Retailer panel data
Number of manufacturers (Numman)	Number of manufacturers whose products are sold in the category	Retailer POS data	Retailer panel data
Category dollar volume (Catvold)	Category sales in dollars	Retailer POS data	Retailer panel data
Average store-brand quality 1 (Qual)	Average response by retail experts to "How does the quality of the best private label supplier compare to the leading national brands in the product category?" (five-point scale)	Hoch and Banerji (1993)	
Average store-brand quality 2	Average response by consumers to "Please indicate your opinion about the quality of private labels when compared with the quality of national brands for each product category" (seven-point scale)	Sethuraman and Cole (1997)	
Ratio of store-brand to national-brand price (Pricerat)	$\frac{\text{Retail selling price of store brand}}{\text{Average retail selling price of national brands in the category}}$	Retailer POS data	Retailer panel data
Store dummies (Sdum1–19)	Equal to 1 if the observation is for that store, equal to 0 otherwise	Retailer POS data	—

Notes POS = point of sale

TABLE 2
Determinants of Retail Margins: Summary of Hypotheses

	Hypothesized Sign of Coefficient for Retail Margin				
	National Brands		Store Brands		
Independent Variables	Percentage Gross Margin	Percentage Contribution	Percentage Gross Margin	Percentage Contribution	Selected Literature Support for Hypotheses
Manufacturer Market Power					
Herfindahl index	–	–	–	–	Scherer and Ross (1990)
Advertising	–	–	–	–	Albion and Farris (1981), Lal and Narasimhan (1996), Steiner (1973, 1978, 1993)
Percentage sold on deal	–	–	–	–	Chevalier and Curhan (1976), Steiner (1984)
Deal depth	–	–	–	–	Chevalier and Curhan (1976), Gerstner, Hess, and Holthausen (1994), Steiner (1984)
Retailer Market Power					
Category distribution	–	–	–	–	Abela and Farris (1999), Scherer and Ross (1990)
Store-brand distribution	–	–	–	–	Abela and Farris (1999), Scherer and Ross (1990)
Store-brand share	+	+	+	+	Mills (1995)
Category price elasticity	–	–	–	–	Albion and Farris (1987), Mansfield (1997)
Consumer/Category Characteristics					
Category penetration	–	?	–	?	Chiang and Wilcox (1997), Lal and Narasimhan (1996)
Purchase cycle	+	?	+	?	Narasimhan and Wilcox (1998)
Purchase amount	–	+	–	+	Lal and Narasimhan (1996), Narasimhan and Wilcox (1998)

high store-brand share reflects the strength of store-brand demand compared with national-brand demand (e g , Raju, Sethuraman, and Dhar 1995)

Basic microeconomic theory predicts an inverse relationship between optimal gross margin and price elasticity for price setters The price elasticity of demand that retailers face varies across categories, partly as a result of varying intensity in retail competition across categories Although we have already included distribution, which is a key variable reflecting the level of competition retailers face, we also directly included category price elasticity We expect that retailers will take lower margins on both national brands and store brands in categories in which the price elasticity of the consumer demand they face is high Finally, because there is no reason to believe that the retailer power variables influence direct product costs, we expect them to have similar effects on gross and net margins

Consumer and category characteristics Retailers may take different margins on categories, depending on how many consumers buy the category, what the typical purchase amount is, and how often it is purchased Their direct product costs may also differ with these variables because purchase cycles and the number of transactions can influence the cost of warehousing, packaging, stocking, cashiering, and so on There is no strong theoretical basis for a priori hypotheses about the effects of the variables on retail margins, however, some prior empirical research does suggest that retailers are willing to take lower percentage gross margins in categories in which the purchase amount or penetration is high (Lal and Narasimhan 1996, Narasimhan and Wilcox 1998) In contrast, retailers may take higher gross margins in infrequently purchased categories because there are fewer opportunities for consumers to compare and learn about prices and for retailers to make money Thus, we expect penetration and purchase amount to be negatively associated with gross margins on both national brands and store brands, and we expect purchase cycle to be positively associated with gross margins on both national brands and store brands Furthermore, because direct product costs such as storage, stocking, and cashiering are likely to be lower as a percentage of sales in categories with large transaction amounts, we expect purchase amount to be positively associated with net margins on national and store brands It is difficult to predict how the different components of direct product costs net out for high penetration and long purchase cycle categories, so we do not hypothesize a specific relationship between these variables and net margins

To control for other unobserved differences across categories, we included dummy variables for the major departments represented in our sample, though we do not have any a priori hypotheses about their coefficients Specifically, for Retailer 1, we included dummy variables for perishable foods and HBC categories because most of the remaining categories are in the grocery department For Retailer 2, we only needed an HBC dummy variable because most of the other categories are in the general merchandise department Finally, to control for Retailer 1's store-level differences in pricing and consequent margins that may be due to factors such as local competition, demographics, and so on, we included 19 store-specific dummy variables As we noted previously, Retailer 2's stores are all from a single market and pricing zone, with identical prices and margins, so we aggregated across stores and did not need store-specific dummy variables

Store-brand share model Retailers may expend more effort to obtain higher store-brand share in categories in which gross margins are higher, and they may raise selling prices of national brands to increase store-brand share This suggests that there may be reverse causality in the relationship between store-brand share and retail margins from national brands To avoid any inconsistency due to this endogeneity, we specified a model for store-brand share and estimated the resultant simultaneous system by using three-stage least squares (3SLS) We modeled store-brand market share as a function of the category characteristics that Hoch and Banerji (1993) find to be significant determinants of store-brand share number of manufacturers, total manufacturer advertising, dollar category volume, retail margin, average quality, and distribution of store brands We included retail margin from national brands because reverse causality may be driven primarily by margin on national brands, as we noted previously In addition, we included both the price elasticity of the category, because we expect the store brand to do better in categories in which consumers are more sensitive to price, and the ratio of store-brand to national-brand price, because store-brand share will increase as its price advantage increases We do not discuss the store-brand share model in detail because it is not central to our research objectives and is directly based on prior research We simply used it to obtain consistent estimates of the coefficients in the profit margin equations

The simultaneous model The previous discussion leads to the following simultaneous system for retail margins on both store brand and national brands and on store-brand share[1]

$$
\begin{aligned}
(1)\quad \text{Margin}_{kij} = {} & \gamma_{k0} + \gamma_{k1}\text{Herfind}_{ij} + \gamma_{k2}\text{Advtg}_i + \gamma_{k3}\text{Deal}_i \\
& + \gamma_{k4}\text{Depth}_i + \gamma_{k5}\text{Catdist}_i + \gamma_{k6}\text{Sbdist}_i \\
& + \gamma_{k7}\text{Catelast}_i + \gamma_{k8}\text{Penet}_i + \gamma_{k9}\text{Puramt}_{ij} \\
& + \gamma_{k10}\text{Purcycle}_i + \gamma_{k11}\text{Perish}_i + \gamma_{k12}\text{HBC}_i \\
& + \gamma_{k13}\text{Sdum1}_j + \quad + \gamma_{k31}\text{Sdum19}_j \\
& + \beta_{k1}\text{Sbshare}_{ij} + \varepsilon_{kij}, \text{ and}
\end{aligned}
$$

$$
\begin{aligned}
(2)\quad \text{Sbshare}_{ij} = {} & \gamma_{50} + \gamma_{51}\text{Numman}_{ij} + \gamma_{52}\text{Advtg}_i + \gamma_{53}\text{Catvold}_{ij} \\
& + \gamma_{54}\text{Sbdist}_i + \gamma_{55}\text{Qual}_i + \gamma_{56}\text{Catelast}_i \\
& + \gamma_{57}\text{Sdum1}_{ij} + \quad + \gamma_{525}\text{Sdum19}_{ij} \\
& + \beta_{51}\text{Margin}_{1ij} + \beta_{52}\text{Pricerat}_{ij} + \varepsilon_{5ij},
\end{aligned}
$$

where k takes values of 1 and 2 for the retailer's gross margins from national and store brands and values of 3 and 4 for corresponding net margins[2] All the variables are defined in Table 1

The system is identified because the margin equation contains seven variables that do not appear in the store-brand share equation and the store-brand share equation contains three variables that do not appear in the margin equations We focus on the three variables excluded from the margin equations First, note that three components of category volume (i e , penetration, purchase amount, and purchase cycle) are included in the margin equation As we discussed previously, the three components may have different effects on margin, and thus we included them separately In contrast, there is no reason to expect differential effects on store-brand share, so the composite category volume variable is included in that equation (Hoch and Banerji 1993) Second, the number of manufacturers is not included in the margin equation, but we included the Herfindahl index, which is a well-established measure of manufacturer concentration Third, the quality variable is a nationwide, general measure of the perceived quality of the best store brands in the country, not the quality of the specific retailer's store brands (see Table 1) By using the store-brand share variable, which is a direct measure that is specific to the retailer, we captured the increased leverage that strong store brands provide over manufacturers We do not expect general, nationwide perceptions of store brands to affect the margins of a particular retailer over and above their effect on that retailer's store-brand share

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[1] The ratio of store-brand to national-brand price (Pricerat) is also treated as endogenous in this system

[2] For Retailer 2, k only takes values of 1 and 2 for gross margins from national and store brands Furthermore, we aggregated data across stores, so there is no j subscript and there are no store-specific dummy variables in the model Finally, because the deal and depth variables are determined by Retailer 2's own decisions and are not based on nationwide retail data, as in the case of Retailer 1, we treat the two variables as endogenous for Retailer 2

Model Estimates

We estimated the model for each retailer by using categories for which we had information on all relevant variables We have complete data on 75 of the 115 categories for Retailer 1 and 45 of the 84 categories for Retailer 2 Correlation matrices of the variables in the margin models for the two retailers are provided in Tables 3 and 4, and 3SLS estimates of the margin equations for both retailers are provided in Table 5[3]

Manufacturer market power Almost all our hypotheses about the effects of the variables pertaining to manufacturer market power are supported The relationship of margins to the Herfindahl index, deal frequency, and deal depth was as we expected The coefficients of the Herfindahl index and deal depth are significantly negative in five of the six regressions, and the coefficient of deal frequency is significantly negative in all six regressions Category advertising has the expected negative effect on both retailers' national-brand margins, but, contrary to expectations, Retailer 1's margin on store brands increases significantly with advertising Perhaps national brands in heavily advertised categories not only have higher wholesale prices but also have somewhat higher retail prices, thus enabling the retailer to charge higher prices for the store brand and still maintain a price advantage over national brands

Retailer market power Our hypotheses about the effects of the variables pertaining to retailer market power are also well supported in both data sets As we expected, store-brand distribution has a negative relationship to both retailers' national-brand and store-brand margins Heavy distribution of store brands increases price competitiveness of store brands instead of providing monopoly power to retailers In addition, store-brand market share has the expected positive coefficient in five of the six regressions The magnitude of the standardized coefficient of store-brand share in the national-brand margin model suggests that store-brand share is one of the most important drivers of retail margins on national brands For Retailer 1, price elasticity is negatively associated with both national-brand and store-brand margins, though its coefficient is not statistically significant for Retailer 2 Contrary to our hypothesis, category distribution is not significant in most of the regressions This may be due to multicollinearity, because the correlation between category and store-brand distribution is 67[4]

Consumer and category characteristics We had only a few a priori hypotheses about the effects of consumer and category characteristics As we expected, purchase cycle has a positive effect on national-brand and store-brand margins for both retailers Purchase amount also has the expected positive effect on net contribution margin and the expected negative effect on gross margin, at least for the store brand of Retailer 2 The coefficient of penetration does not support our hypothesis It is positive for Retailer 1 and insignificant for Retailer 2

Summary Table 6 summarizes our results for both retailers For each of our a priori hypotheses, it depicts whether or not the hypothesis was supported The symbol "✓" denotes that the estimated coefficient is significant and of the hypothesized sign, and the symbol "X" denotes that the estimated coefficient is significant but not of the hypothesized sign As the large number of "✓s" show, most of the variables pertaining to manufacturer, retailer, and consumer and category characteristics influence retail profit margins on national brands and store brands as we hypothesized The pattern of coefficients is similar for both retailers, though statistical significance is weaker for Retailer 2 because of its small sample size This similarity provides important convergent validity for our results Particularly notable is our finding that after we controlled for other key determinants and endogeneity of store-brand share, high store-brand share enables retailers to obtain significantly higher percentage margins on national brands We find this result for both data sets in our analysis, despite substantial differences in the type of retailers, the product categories they sell, and their pricing and promotion policy

The Store Brand–National Brand Margin Differential

The Percentage Margin Differential

Having developed some important insights into the determinants of retailers' percentage margins on national brands and store brands, we now examine the differential between the two Table 7 reports the median ratio of store-brand to national-brand margins for the two retailers across all categories and for the retailers' major departments

The first row of Table 7 confirms that on average across all the categories, not only percentage gross margins but also percentage net margins are substantially higher for the store brand than for national brands The numbers for both retailers are consistent with the 20%–25% gross margin advantage for store brands that is noted in the literature (Hoch and Banerji 1993) The numbers are higher than the 16% margin advantage that Albion and Farris (1987) find for unadvertised versus advertised brands, but that is not surprising because only approximately 50% of the unadvertised brands in their sample were store brands The remaining rows of Table 7 show that the ratio varies substantially across departments For example, the store brand–national brand margin ratio is high in the HBC department for both retailers, likely because HBC contains strong brand names with heavy advertising that can command substantially higher wholesale prices from retailers In contrast, Retailer 1 does not have a store-brand margin advantage in its general merchandise department, which contains many commodity categories, such as pet supplies, shoe care, and stationery The wholesale prices of national brands in this department are probably quite close to the competitive wholesale prices of

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[3] Estimates of the store-brand share equation are available from the first author on request

[4] In addition, category distribution may not accurately reflect retail competition in some categories, such as light bulbs, in which category distribution may be high, but retailers carry different national brands to reduce competition

TABLE 3
Correlation Matrix: Retailer 1
(1469 Observations)

	Nbgm	Nbcm	Sbgm	Sbcm	Herfind	Advtg	Deal	Depth	Catdist	Sbdist	Sbshare	Catelast	Penet	Purcyc	Puramt	Perish
Nbgm	1															
Nbcm	91	1														
Sbgm	49	49	1													
Sbcm	45	51	96	1												
Herfind	13	07	-16	-15	1											
Advtg	-27	-19	09	16	-15	1										
Deal	-35	-28	-45	-37	04	06	1									
Depth	-21	-26	-03	-07	-14	-04	14	1								
Catdist	-21	-19	03	01	-12	21	-18	-08	1							
Sbdist	-25	-17	-03	01	-21	32	-07	-13	67	1						
Sbshare	26	23	-01	-02	39	-22	-06	-20	-08	01	1					
Catelast	-20	-07	-16	-07	-15	17	29	-33	19	31	-05	1				
Penet	-08	-09	-28	-26	12	-08	39	11	-00	-09	21	13	1			
Purcycle	16	25	37	40	-15	-07	-30	07	03	11	-13	-04	-56	1		
Puramt	-04	18	25	38	-02	30	-12	-29	21	29	-16	30	-34	22	1	
Perish	15	16	-08	-07	15	-13	22	01	-81	-50	15	-22	07	-28	-14	1
HBC	-10	-03	42	42	-28	32	-27	21	32	39	-22	-09	-44	41	36	-23

TABLE 4
Correlation Matrix: Retailer 2
(45 Observations)

	Nbgm	Sbgm	Herfind	Advtg	Deal	Depth	Catdist	Sbdist	Sbshare	Catelast	Penet	Purcyc	Puramt
Nbgm	1												
Sbgm	57	1											
Herfind	27	-32	1										
Advtg	-34	12	07	1									
Deal	-36	-38	11	02	1								
Depth	-19	04	-18	06	19	1							
Catdist	-11	-02	-09	31	-21	06	1						
Sbdist	-28	-05	-16	24	01	-06	54	1					
Sbshare	36	03	22	-17	-03	-24	03	-03	1				
Catelast	-16	-21	-21	25	34	-25	24	34	-03	1			
Penet	-11	-09	17	-11	27	04	02	-14	23	17	1		
Purcycle	26	28	-11	-02	-22	09	05	15	-09	02	-59	1	
Puramt	02	33	06	27	-17	-34	27	26	-07	36	-41	26	1
HBC	04	09	-26	38	-36	16	29	44	-19	-05	-37	38	32

TABLE 5
Determinants of Percentage Margins

	Standardized Coefficient in Equation for					
	Retailer 1				Retailer 2	
	National Brands		Store Brand		National Brands	Store Brand
Independent Variable	Percentage Gross Margin	Percentage Contribution	Percentage Gross Margin	Percentage Contribution	Percentage Gross Margin	Percentage Gross Margin
Herfindahl index	-004	-059***	-159***	-143***	-284***	-417***
	(-15)	(-2 16)	(-5 89)	(-5 42)	(-2 27)	(-2 77)
Advertising	-059***	-044***	103***	131***	-315***	082
	(-2 28)	(-1 76)	(4 28)	(5 57)	(-2 83)	(11)
Percentage sold on deal	-252***	-192***	-286***	-231***	-523***	-293***
	(-9 57)	(-7 48)	(-11 15)	(-9 18)	(3 62)	(-2 81)
Deal depth	-191***	-212***	-088***	-116***	-172**	-007
	(-7 23)	(-8 15)	(-3 30)	(-4 44)	(-1 82)	(-08)
Category distribution	-094***	-010	-026	-121***	-087	-133
	(-2 06)	(-22)	(-57)	(-2 68)	(-1 12)	(1 09)
Store-brand distribution	-179***	-166***	-305***	-240***	-308***	-434***
	(-5 24)	(-5 03)	(-9 44)	(-7 57)	(-3 62)	(-3 97)
Store-brand share	424***	353***	233***	121***	312***	194
	(8 34)	(7 21)	(4 91)	(2 61)	(2 74)	(1 06)
Price elasticity	-064***	-052**	-067***	-079***	-118	172
	(-2 34)	(-1 96)	(-2 53)	(-3 08)	(-77)	(73)
Category penetration	105***	250***	144***	243***	-044	-026
	(3 60)	(8 73)	(4 87)	(8 34)	(-17)	(-31)
Purchase cycle	201***	377***	211***	295***	186*	341**
	(6 98)	(13 36)	(7 30)	(10 36)	(1 61)	(1 88)
Purchase amount	-034	207***	146***	298***	-042	-231**
	(-1 34)	(8 21)	(5 57)	(11 52)	(-64)	(-1 89)
Perishable foods	048	200***	-038	-059	—	—
	(1 19)	(4 96)	(-90)	(-1 42)		
HBC	020	-004	367***	315***	033	-062
	(70)	(-15)	(12 28)	(10 71)	(82)	(-68)

*$p < 15$
**$p < 10$
***$p < 05$

Notes There are 19 store dummy variables in Retailer 1's model, the coefficients are not reported here to conserve space The t-statistics are in parentheses

TABLE 6
Determinants of Retail Margins: Summary of Results

	Sign of Coefficient in Equation for									
	National-Brand Margin					Store-Brand Margin				
	Percentage Gross Margin			Percentage Contribution		Percentage Gross Margin			Percentage Contribution	
Independent Variable	Hypothesized	Retailer 1	Retailer 2	Hypothesized	Retailer 1	Hypothesized	Retailer 1	Retailer 2	Hypothesized	Retailer 1
Manufacturer Market Power										
Herfindahl index	–	N S	✓	–	✓	–	✓	✓	–	✓
Advertising	–	✓	✓	–	✓	–	X	N S	–	X
Percentage sold on deal	–	✓	✓	–	✓	–	✓	✓	–	✓
Deal depth	–	✓	✓	–	✓	–	✓	N S	–	✓
Retailer Market Power										
Category distribution	–	✓	N S	–	N S	–	N S	N S	–	✓
Store-brand distribution	–	✓	✓	–	✓	–	✓	✓	–	✓
Store-brand share	+	✓	✓	+	✓	+	✓	N S	+	✓
Category elasticity	–	✓	N S	–	✓	–	✓	N S	–	✓
Consumer/Category Characteristics										
Category penetration	–	X	N S	?	+	–	X	N S	?	+
Purchase cycle	+	✓	✓	?	+	+	✓	✓	?	+
Purchase amount	–	N S	N S	+	✓	–	X	✓	+	✓

Notes ✓ = statistically significant and of hypothesized sign, X = statistically significant but not of hypothesized sign, N S = not significant

TABLE 7
Store-Brand Versus National-Brand Percentage Margins

	Retailer 1: Median Ratio of Store-Brand Margin to National Brand Margin			Retailer 2: Median Ratio of Store-Brand Margin to National-Brand Margin	
Group	**Number of Observations**	**Percentage Gross Margin**	**Percentage Net Margin**	**Number of Observations**	**Percentage Gross Margin**
Full sample	2063	1 27	1 27	84	1 29
Dairy products	184	1 10	1 06	0	—
Frozen foods	254	1 18	1 16	0	—
Specialty foods	89	1 05	99	0	—
Grocery	1026	1 30	1 30	11	1 40
General merchandise	161	92	74	37	1 26
HBC	349	1 73	1 75	36	1 37

store brands, thus bringing the retailers' margins on national and store brands closer together

Cross-Category Determinants of the Percentage Margin Differential

To examine the variations in the percentage margin differential across categories more systematically, we estimated a 3SLS model with the same explanatory variables as in the previous section, but with the retailer's margin on the store brand minus the margin on national brands as the dependent variable Note that any variables that influence the margin differential do so by influencing one or both of its components The (unstandardized) effect of any variable on the differential will be equal to its effect on store-brand margin minus its effect on national-brand margin (Farris, Parry, and Ailawadi 1992) Thus, only variables that have a substantially different influence on the retailer's store-brand margin rather than its national-brand margin will have a significant impact on the margin differential

Table 8 summarizes the 3SLS coefficient estimates of the margin differential model for both retailers As can be predicted from Table 5, many of the variables that pertain to manufacturer and retailer power have a significant influence on the margin differential because their impact on store-brand margin is different from their impact on national-brand margin We discuss the most important influences here First, category advertising significantly increases the margin differential because retailers must take lower margins on national brands in heavily advertised categories, but their store-brand margins do not appear to suffer Second, the depth of deals in the category also increases the differential, probably because the deep discounts on national brands hurt the retailer's national-brand margins, and store brands are not discounted heavily from their everyday low prices Third, store-brand distribution significantly reduces the margin differential It appears that retailers need to price their store brands even more competitively than national brands when several competing retailers also offer a store brand They do not seem to benefit from any local monopoly on their particular store brand Fourth, store-brand share also reduces the margin differential The retailer is able to obtain lower wholesale prices and therefore earn higher margins on national brands as store-brand share increases As a result, the store-brand margin advantage becomes smaller

The Dollar Margin Differential

As we noted in the first section, that retailers earn higher percentage margins on store brands than on national brands does not guarantee that their dollar margins on store brands will also be higher For the dollar margins on national brands and store brands to be equal, the ratio of store-brand percentage margin to national-brand percentage margin must be equal to the ratio of national-brand retail price to store-brand retail price Given the substantially lower price at which store brands sell, the retailer's dollar margin may be lower on store brands if the percentage margin advantage is low

Table 9 summarizes the ratio of store-brand to national-brand prices and dollar margins for both retailers[5] The contrast between Table 7 and Table 9 is noteworthy Although both retailers have similar store-brand percentage margin advantages, Retailer 2 has a store-brand dollar margin advantage but Retailer 1 does not On average, Retailer 1's gross dollar margin per unit from store brands is lower than that from national brands in all the departments except HBC The same is true of net contribution dollar margin As Table 9 shows, for Retailer 1, the percentage margin advantage that the store brand offers does not make up for the substantially lower retail price of the store brand Thus, from a perspective of dollar margin per unit, store brands do not necessarily offer retailers an advantage unless they are able to keep a relatively low price differential between the store brand and national brands

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[5] It is a challenge to compute dollar margin per unit because individual items are measured in different sizes and units, not only across categories but also within a category Furthermore, as is typical with scanner data, the size variable is not available in a numeric form that is easy to use in computations We did our best to compute dollar margins per unit correctly However, to minimize the impact of outliers that may have been a result of incomparable units of measurement, we sorted items in each category according to their dollar margin per unit and deleted the top and bottom 5% from this analysis

The Profitability of Store-Brand Users

Our finding that a retailer's dollar margin per unit may be lower on store brands than on national brands suggests that, all else being equal, a customer who buys store brands contributes less to the total dollar profit of a retailer than does a customer who buys national brands As we discussed previously, all else may not be equal A customer's contribution to the total dollar profit of the retailer depends not only on the dollar margin per unit of purchased items but also on the total number and type of items bought In this section, we

TABLE 8
Determinants of the Percentage Margin Differential

Independent Variable	Retailer 1 Percentage Gross Margin Differential	Retailer 1 Percentage Net Contribution Differential	Retailer 2 Percentage Gross Margin Differential
Herfindahl index	– 152***	– 087***	– 141***
	(–5 48)	(–2 99)	(–2 52)
Advertising	164***	185***	334***
	(6 56)	(7 04)	(2 74)
Percentage sold on deal	– 080***	– 076***	238***
	(–3 06)	(–2 77)	(3 12)
Deal depth	074***	062***	158**
	(2 74)	(2 22)	(1 77)
Category distribution	060	– 118***	– 048
	(1 29)	(–2 42)	(–1 08)
Store-brand distribution	– 165***	– 108***	– 129**
	(–4 92)	(–3 07)	(–1 72)
Store-brand share	– 126***	– 186***	– 118***
	(–2 57)	(–3 60)	(–2 15)
Price elasticity	– 016	– 042*	274**
	(– 59)	(–1 47)	(1 92)
Category penetration	057**	036	021
	(1 91)	(1 14)	(17)
Purchase cycle	044*	– 022	148**
	(1 49)	(– 73)	(1 75)
Purchase amount	187***	141***	– 206*
	(7 08)	(5 11)	(–1 53)
Perishable foods	– 079**	– 239***	—
	(–1 88)	(–5 43)	
HBC	369***	341***	– 089
	(12 23)	(10 87)	(– 73)

*$p <$ 15
**$p <$ 10
***$p <$ 05
Notes There are also 19 store dummy variables in Retailer 1's models, t-statistics are in parentheses

TABLE 9
Store-Brand Versus National-Brand Dollar Margins

	Median Ratio of Store Brand to National Brands		
Group	**Price per Unit**	**Dollar Gross Margin per Unit**	**Dollar Net Margin per Unit**
Retailer 1			
Full sample	70	87	89
Dairy products	77	87	89
Frozen foods	69	78	77
Specialty foods	62	68	69
Grocery	70	90	91
General merchandise	59	60	57
HBC	62	1 18	1 26
Retailer 2			
Full sample	91	1 18	—
Grocery	82	1 15	—
General merchandise	87	1 10	—
HBC	94	1 29	—

explore how the profitability of heavy store-brand users compares with that of light users or nonusers

Method for Profitability Comparison

To perform the analysis for the market-basket data for Retailer 1, we used 646,549 market baskets that had nonmissing profitability data and that included at least one item from the 115 categories in which a store brand was offered For each market basket, we computed the percentage of items purchased from these 115 categories that are the store brand This procedure accounts for the availability of store brands in the categories represented in the basket and ensures that a large basket is not characterized as having low store-brand share simply because it contains many items from categories that do not have a store brand Approximately 40% of the baskets do not contain any store-brand items, and in slightly more than 25% of the market baskets, store-brand items constitute less than 35% of the total number of items in which a store brand could have been bought We used cutoffs of 0% and 35% to split the baskets into zero, low, and high store-brand share baskets, and then we compared mean profitability across the three groups of baskets As we noted previously, we did not have panel data for Retailer 1 and thus could not identify baskets from the same household The data provide some insights at the basket level but do not speak to the total profitability of a customer

However, for Retailer 2 we did have panel data, so we could directly examine the relationship between customer-level profit and store-brand purchasing levels We calculated the share of each customer's purchases that were store-brand items, and using the same cutoffs as we did for Retailer 1, we compared profit across groups of customers with zero, low, and high share

We conducted this exploratory but less constrained comparison of groups instead of estimating a continuous relationship between store-brand share and market-basket/customer profitability because prior research does not enable us to predict a specific kind of relationship

Results of Profitability Comparison

Table 10 provides the mean values of four profit measures across the three groups of market baskets for Retailer 1 and the three groups of customers for Retailer 2 total gross margin dollars, total contribution margin dollars, total gross margin as a percentage of sales, and total contribution margin as a percentage of sales It also provides the mean size of market baskets and customer sales in terms of both dollar value and number of items Given the large sample sizes in both cases, group differences are statistically significant for all the variables, so we focus on managerial importance in the insights we draw from this table

Percentage margin differences For Retailer 1, there is little managerially significant difference across zero, low, and high store-brand baskets in either gross or net contribution margins as a percentage of sales Given that percentage

TABLE 10
Store-Brand Share and Retailer Profitability

Retailer 1

	Mean Value for Market Baskets Whose Store-Brand Share Is		
Variable	**0%**	**<35%**	**≥35%**
Percentage gross margin	27 6%	26 2%	27 4%
Contribution margin/sales	21 1%	19 9%	20 2%
Total gross margin dollars	$3 12	$9 95	$5 48
Total contribution dollars	$2 48	$7 67	$4 14
Total number of Items	5 98	23 28	13 45
Total dollar amount	$11 30	$38 54	$20 78
Percentage of market baskets	40 7%	27 6%	31 7%

Retailer 2

	Mean Value for Customers Whose Store-Brand Share Is		
Variable	**0%**	**<35%**	**≥35%**
Percentage gross margin	27 4%	32 4%	36 8%
Total gross margin dollars	$15 88	$77 79	$48 35
Total number of items	16 27	80 17	46 26
Total dollar amount	$54 68	$244 23	$128 53
Number of trips	3 15	10 12	7 05
Percentage of customers	11 7%	77 1%	11 2%
Percentage male	22 2%	22 5%	33 3%
Household size	2 8	2 8	2 6
Age	47 4	46 6	53 1
Percentage bought on coupons	8 3%	8 7%	6 6%
Percentage bought on promotion	32 0%	32 1%	33 4%

margins are higher for store brands than for national brands, we expected that the average would be somewhat higher in market baskets with a high share of store brands The small difference suggests that market baskets with a high share of store brands contain other products that have somewhat lower percentage gross margins than average In contrast, for Retailer 2, the average percentage gross margin from heavy users of store brands is much higher than from nonusers Thus, there is no evidence that heavy store-brand users disproportionately buy other low-percentage-margin products from this retailer to offset their higher-percentage-margin store-brand purchases

Dollar margin differences Average dollar profit varies substantially across the groups for both retailers There is an inverted U-shaped relationship between store-brand share and profit For Retailer 1, the dollar profit of baskets with low store-brand share is the highest, it is almost twice that of high store-brand baskets and more than three times that of zero store-brand baskets This is because zero and high store-brand baskets are much smaller than low store-brand baskets The inverted U-shaped relationship also holds when we examined groups of customers, not just groups of baskets, for Retailer 2 The dollar profit is highest for the light store-brand users, dropping by roughly half among the heavy store-brand users and by much more among nonusers The difference in dollar profit across customer groups is due to heavy store-brand users making fewer trips and buying much less from the retailer than light store-brand users do, nonusers make the fewest trips and buy the least

Why is the profitability of customers who do not buy store brands at all so small? It would appear that they are not loyal to the retailer Not only the size of their average market basket but also their total number of trips and their total purchases from the retailer are small This is consistent with research that shows a positive relationship between store-brand use and store loyalty (Ailawadi, Neslin, and Gedenk 2001, Corstjens and Lal 2000) Perhaps the unwillingness of the customers to buy the store brand at all is a reflection of their relatively weak perception of the retailer

Why is the profitability of heavy store-brand users also small? They do not just make more frequent trips to the same store and buy less per trip This is evidenced by not only the market baskets of Retailer 1 but also the total customer profit of Retailer 2 showing the same pattern Heavy store-brand users may (1) operate under financial constraints and simply buy and consume less, (2) have smaller families and therefore fewer requirements, or (3) shop at multiple stores and therefore contribute less to the sales and profit of any single retailer Prior research provides strong evidence that heavy store-brand users operate under financial constraints and are price conscious (Ailawadi, Neslin, and Gedenk 2001, Batra and Sinha 2000, Richardson, Jain, and Dick 1996), in support of the first explanation The limited demographic data that are available on the customers of Retailer 2 also provide some support for the second explanation The last five rows of Table 10 display the demographic profile of the three groups of Retailer 2's customers and indicate that, in general, nonusers and light users are much more similar to each other than they are to heavy users This is consistent with our belief that the factors underlying fewer purchases by heavy store-brand users are quite different from the factors underlying fewer purchases by non-store-brand users Nonusers of store brands are not significantly different from light users in terms of gender, household size, or age, so it is difficult to argue that they have fewer requirements It is more likely that they are the least loyal to the retailer Heavy users of store brands are older and have smaller households than do light users or nonusers, suggesting that they may have fewer requirements

However, it is unlikely that differences in requirements completely explain the substantial difference in expenditure between light and heavy store-brand users Perhaps heavy store-brand users shop and "cherry-pick" at multiple stores and therefore buy less from any one retailer This is consistent with a Food Marketing Institute (1994) study that found heavy store-brand buyers at several different stores Heavy store-brand buyers may buy store brands wherever they shop because they consider them a good value (i e , they may be loyal to store brands in general, not to the store brand of a particular retailer) This appears to contradict the positive relationship between store-brand use and store loyalty that Ailawadi, Gedenk, and Neslin (2001) and Corstjens and Lal (2000) observe However, the positive association these researchers find in their linear models may be driven by the higher loyalty of store-brand users than nonusers rather than heavy store-brand users versus light users Our analysis suggests a nonlinear relationship between store-brand use and store loyalty

Discussion

In this article, we developed an econometric model of the percentage margins that retailers earn on national brands and store brands We used data from two different retailers to estimate our model and to identify the key factors that explain why the margins vary across categories This analysis provided several insights into the role of variables such as manufacturer concentration, advertising, and distribution in decreasing retail margins on national brands and store brands The analysis also resolved a debate about the effect of store-brand share on retail margins from national brands and showed that the store-brand share effect is significantly positive It also suggests some avenues for further research First, although we accounted for the endogeneity of store-brand share by using 3SLS, we were limited by an essentially cross-sectional data set Longitudinal data would allow for more flexibility in selecting instrumental variables and in examining how margins change with store-brand share Similarly, a "before–after" quasi experiment that examines how national-brand margins change after a store brand is introduced would provide a convincing test of the direction of causality (e g , Pauwels and Srinivasan 2003) Second, there may be interactions between some of the determinants of retail margins in our model We tested for an interaction between advertising and distribution (Abela and Farris 1999) and between store-brand quality and store-brand share (Narasimhan and Wilcox 1998), and we found that they were not significant However, there may be other interactions that further research should consider. Third, both self- and cross-price elasticity determine product-line pricing and margins, according to economic theory. Although we included the category price elasticity in our model, further research should also account for the self- and cross-price elasticities of national and store brands. Fourth, our interest was in distinguishing between retail margins on national brands and store brands, but margins on individual national brands also vary substantially and should be studied. It would be worthwhile to integrate such analysis with research on retail price elasticities and retailer pricing strategies (e.g., Shankar and Bolton 2003).

Next, we examined the impact of store-brand share on retail margins in more detail by answering three hitherto unaddressed questions: (1) Are percentage margins on store brands higher than on national brands, and why does this margin advantage vary across product categories? (2) Does the store-brand advantage hold when we consider dollar margin per unit? and (3) How much do heavy store-brand users, compared with light users and nonusers of store brands, contribute to the total dollar profit of a retailer? On average, we found that percentage margins on store brands are significantly higher than on national brands; thus, all else being equal, category percentage margins increase with store-brand share. However, there are substantial variations across categories; the store-brand margin advantage is greater in heavily advertised categories and smaller in categories with widely available store brands and high store-brand share. Furthermore, the store-brand margin advantage does not necessarily hold when we consider dollar margin, because though store brands earn higher percentage margins, they are sold at substantially lower retail prices than national brands are. Thus, retailers' rushing to increase store brands across categories simply because of their higher percentage margins may not be a good idea. Retailers should expand their store-brand offering carefully and recognize that the biggest margin rewards are in categories in which competition from other retailers is relatively small and national brands are heavily advertised. Retailers should also try to position the store brand on reasonable quality, not just on low price, because having to compete heavily on price erodes store brands' dollar margin advantage.

Our findings about the profitability of heavy store-brand users also send a cautionary message to retailers. There are two pieces of "good news" here. First, heavy users do not selectively buy other items that are significantly less profitable on a percentage basis for the retailer. Second, customers who buy at least some store-brand items contribute much more to the sales and profit of the retailer than do customers who do not buy any store-brand items. However, heavy store-brand buyers buy significantly fewer items in total and therefore contribute much less to the dollar profit of the retailer than do light store-brand buyers. This is a notable finding that deserves further examination because it sheds light on the profitability of customers attracted by store brands. Existing research and our preliminary analysis that used the panel data from Retailer 2 suggest that heavy store-brand buyers have fewer requirements either because they are financially constrained, buy less, and consume less or because they have smaller households. However, it may also be that they shop at multiple stores and are loyal to store brands in general, not to the store brand of a particular store. Further research that combines more detailed demographic and psychographic variables with panel-purchase and profit data from multiple retailers in a market is needed in order to conclusively determine which explanation is true and to study the implications of each explanation for total retailer profit. It would also be useful to conduct a cross-retailer analysis that compares the profitability of retailers with relatively weak store brands with that of strong store brands.

Some authors have noted that increasing store-brand share beyond a certain point may not be wise. They argue that there may be a downside to high store-brand share because national brand manufacturers may no longer find it worthwhile to offer better prices and trade deals (e.g., Narasimhan and Wilcox 1998; Wellman 1997). For both retailers in our analysis, there was wide variation in store-brand share across categories, but we did not find a negative relationship between store-brand share and retail margins on national brands, even at high levels of store-brand share.

However, in the final analysis, it is not just percentage margin but also dollar profit that matters; here, there seems to be a downside to high store-brand share. First, at least in some cases, the dollar margin per unit from store brands is actually smaller than that from national brands, because store brands command much lower retail prices. Second, customers with medium rather than high levels of store-brand use appear to be the most profitable from a standpoint of total dollar profit. Retailers may find it worthwhile to offer store brands despite lower dollar margins, partly as leverage over manufacturers but partly to provide a lower price alternative to price-conscious consumers whose patronage they may otherwise lose. However, our analysis suggests that pushing store brands too much at the expense of national-brand offerings is not advisable. It is important that retailers retain a balance between store brands and national brands to attract and retain profitable customers who buy some store-brand items but not too many. This supports the view that national brands continue to be traffic builders and that reducing national brand choices may make a store less attractive to profitable shoppers (e.g., Farris and Ailawadi 1992; Johnson 1994). This is also consistent with Corstjens and Lal's (2000) finding that for a quality store-brand strategy to be profitable, there should be enough customers who buy national brands.

In closing, we recognize three limitations of our data. First, we study only two retailers, and though their store-brand shares are in line with nationwide averages, it would be valuable to test our model with data from more retailers. Still, we want to reiterate that the two retailers are different from each other in significant ways, and yet most of our empirical results from both data sets are similar. We believe this establishes the convergent validity of our results rather well. Second, manufacturers sometimes provide lump-sum trade allowances to retailers that are not linked to a particular item or even to a particular product category, and these data were not available to us. However, the lump-sum payments are made across multiple categories, so it is unlikely that they would systematically bias the coefficients in our category-level margin model. Third, the store-brand quality data we use are older than the data from the two retailers Sethuraman and Cole (1997) conducted a survey that asked consumers to rate the quality of store brands compared with that of national brands, but we could not use their data in our analysis because they were gathered only for a subset of the categories we study However, the correlation with the Hoch and Banerji (1993) data is 70 across the categories for which both sets of data are available, suggesting that the cross-category quality differences that Hoch and Banerji (1993) report are valid for our analysis

In conclusion, we note that the interactions among manufacturers and retailers, retailer power and profit margins, and the role that store brands play are important issues in both the business and the academic press We hope that this article has provided convincing answers to some questions about the impact of growing store-brand share on retailer margins and has provided food for thought and specific directions for further examination of other questions

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Book Reviews

Six Degrees: The Science of a Connected Age
by Duncan J. Watts (New York: W.W. Norton, 2003, 368 pp., $27.95)

As a marketer, I do not know what to make of this book As a network researcher, I do not know what to make of this book As a consumer of pop-science readings, I do not know what to make of this book

There is already quite a bit of hype around *Six Degrees The Science of a Connected Age*, and the result is a network phenomenon itself The buzz that the book has generated is functioning much like the game of telephone The earliest sources may have actually read the book, but later players almost assuredly have not, given the errors in the publicity that the book has received For example, reviewers in both the popular press and at Web sites where the book can be purchased hail Watts as a pioneer of the "six degrees of separation" or "small-world phenomenon" Given that Milgram's small-world experiment ("Can a random sample of Nebraskan citizens reach a particular stimulus Boston stockbroker?") was published in 1967, and *Six Degrees*' cover puts Watts at 31 (i e , born in 1971), he must have been precocious indeed to have been one of the phenomenon's pioneers Fortunately, Watts himself makes no such claims and appropriately gives Milgram his due (pp 37–42), though he also pulls out the rug from under Milgram when he presents Judith Kleinfeld's attempt to replicate the research (pp 133–35) Kleinfeld discovered that a third of the sources asked to contact the Bostonian broker actually lived in Boston, another third lived in Nebraska but were in the stockbrokerage business, and of the remaining third (truly random people in Nebraska who were not in the financial field), fewer than 20% of their attempts to contact the stimulus person were successful at all, never mind in six links Hmm

It is easy enough to see why *Six Degrees* has a good deal of broad appeal Consider its opening paragraph (p 19)

> The summer of 1996 was a sizzler Across the nation, the mercury was climbing to record highs and staying there, a mute testimony to climatic unpredictability Meanwhile, closeted in their domestic fortresses, Americans were stacking their refrigerators, cranking the air-conditioning, and no doubt watching a record amount of mind-deadening television In fact, no matter what the season or the weather, Americans have become increasingly reliant on a truly staggering and ever growing array of devices, facilities, and services that have turned a once hostile environment into the lifestyle equivalent of a cool breeze No amount of inventiveness or energy is excessive if it results in the creation of leisure, the increase of personal freedom, or the provision of physical comfort From climate-controlled vehicles the size of living rooms to climate-controlled shopping malls the size of small cities, no effort or expense has been spared in modern America's endless crusade to impose strict discipline on a once unruly and still occasionally uppity planet

An example of a power outage and the interconnections in the electric grids across the nation follows the introduction As the excerpt illustrates, the writing is clear, lively, and engaging It is also rather glib for an academic [1] This tone carries throughout the entire book, which is probably fun for the nontechnical reader, but the serious academic tires of the constant "Aren't I clever!" overtures My first question about this book is a marketing one What is the book's intended target audience? I can only presume it is intended to be a popularization of networks and systems science for a general-science readership, analogous to Stephen Hawking's books that popularize astrophysics (e g , *The Universe in a Nutshell*) Hawking achieves this so much more effectively, but he is a genius Still, Hawking gives his readers a sense of "Wow!" "Oh my gosh!" and "The world is magnificent!" whereas Watts at best elicits an "Oh, hey, yeah, that's cool " Still, I suppose that is more affect than the typical journal article yields

What is the point of popularizing network and systems science? Perhaps it is a personal agenda, or perhaps it is an attempt to convince the National Science Foundation of the area's importance and worthiness of additional funding However, I do not believe that there is enough depth in *Six Degrees* for even the casual reader to change his or her thinking about the world The book is too long to be an elementary introduction, the type a popular science magazine might offer readers

Assume that popularizing this particular science was Watts's goal There are many examples spanning many disciplines that Watts abstracts and incorporates into network (connected systems) thinking He treats most topics superficially (though to be fair, he develops a few examples more completely) Here are examples of the puff and many superficial treatments that Watts discusses

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[1] The criticisms of U S energy usage (even if readers agree) rankle unless Watts considers himself to have adopted his host nation (he is an expat, of the Australian variety—a comment only on the book's author, certainly not of Australians in general)

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- Exercises equivalent to children's party games (e.g., origami tricks to build a torus [the doughnut-shaped function learned in calculus], p. 85)
- Current manifestations of networks, such as chain e-mails (p. 158)
- The "Kevin Bacon game" (p. 93, i.e., an actor who stars in a movie with Bacon is assigned a score of 1, an actor who stars in a movie with an actor who starred with Bacon receives a 2, and so on), which is a contemporary version of the Erdos numbers (i.e., if someone has published with this prolific mathematician, that person's Erdos number is a 1, if someone has published with one of Erdos's coauthors, that person is a 2, and so on, p. 137). Apparently, the biggest challenge with Erdos numbers is tracking the network to determine one's own number (I'm a four, if that helps anyone who has worked with anyone I've worked with). This reduces quickly to parlor games.
- AIDS and the central character in a network that helped the medical community turn the corner in learning about the disease's epidemiological spread (p. 164), as is also depicted in a fabulous though brief scene in *And the Band Played On* in which a blackboard is covered with a network diagram
- The network phenomenon of *contagion* in general. The word can mean communication or friendship patterns, but originated in medical applications, and is applied to the spread of viruses among humans (e.g., Ebola plagues), animals (e.g., foot-and-mouth disease), and computers (he boldly offers prescriptions to Microsoft, making at least this reader wonder, If Watts wanted to talk to Bill Gates in person, what room would be big enough for both of their egos?)
- Word of mouth (e.g., Harry Potter, *The Blair Witch Project*), opinion leaders, and cognitive networks and information processing
- The puffery of the dot-coms, which now seems a bit stale and even a little mean-spirited given their massive passing
- The Bible, which he boldly misinterprets (p. 108), which surely carries the penalty of going to network hell (presumably watching the movie *Six Degrees of Separation* and all Kevin Bacon movies over and over or inverting huge sociomatrices by hand)

What is the point of all the illustrations? "Here's an example of networks!" "Look, here, too!" To what end?

Watts discusses several phenomena and disciplines, attributing their underlying mechanisms to networks. It is acceptable that networks are the lens through which he tries to make sense of his world, but he is not successful in convincing readers that several examples have much to do with networks at all (e.g., the synchrony of runners in a race clumping together around a track [p. 32], the rich getting richer [p. 108]).

Yet I type these criticisms with a grin on my face. The guy has guts. Who do you know who likens "a pack of hungry physicists" to both "lords of the academic jungle" and to intellectual "scavengers" who "descend with fury" (p. 62)? The breadth of network applications offered in this book speaks for itself, and it means to me that Watts is intellectually playful and curious, which is an admirable (and surprisingly rare) quality in a scientist. However, I cannot determine his actual depth of understanding. He gleefully admits trying to learn about network issues without reading the literature so as to allow for creative solutions and to be unencumbered by existing paradigms. It is not clear whether he has subsequently read a few literatures deeply, rather than many literatures broadly and lightly, because the level of discussion is so superficial. However, for a popular press outlet, it probably must be so. Still, his discussions, knowledge, references, and disciplines cited seem spotty. The transportation literature seems an obvious oversight, nowhere does Watts address difficult network issues (e.g., sampling, modeling), and our own personal network idols and revered cites overlap only a little, with few actors spanning both cliques. Thus, an exhortation to budding academics: Begin by steeping yourself in the literature, and know a few things very well.

Watts's book is not a work of scholarship. The bibliography is rather good (more extensive than it would be if the target audience is indeed a popular readership). However, with the exception of the studies that he actually discusses, Watts spends no time giving credit where credit is due (which may well have led to the popular, though mistaken, belief that he is one of the original small-world thinkers). This error violates a chief principle to which academics adhere.

What does the author claim that the book's contribution is? The conclusion (p. 299) states that "distance is deceiving" (presumably, Watts means physical distance, rather than social or perceptual distance). Another conclusion offered is that cause and effect are difficult to pinpoint in interconnected systems. Finally, he closes with a praise to scientists and their heroic endeavors. Again, I say, hmm.

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Marketing and the Bottom Line: Creating the Measures of Success, 2d ed.
by Tim Ambler (London: Financial Times/Prentice Hall, 2003, 336 pp., £21.99)[2]

Understanding and Justifying Our Existence

"Accountability" is the new (old) buzzword in marketing today. Managers report intense pressure to justify the worth of marketing activities in a flagging economy. For the third consecutive cycle, the Marketing Science Institute's top research priorities include marketing metrics and marketing productivity as key topics (Marketing Science Institute 1998, 2000, 2002). Other institutions such as the Marketing Leadership Council in Washington, D.C., and the Chartered Institute of Marketing in the United Kingdom are urgently researching how to best measure and report the impact of marketing, usually in financial terms.

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[2] This edition of *Marketing and the Bottom Line* was released in the United Kingdom in May 2003.

Sporadic attention has been paid to measuring marketing performance for decades Economic research on the productivity of marketing in the overall U S economy dates back to the 1920s (for a review, see Bonoma and Clark 1988) In the 1960s and 1970s, the first financial perspectives were brought to firm-level activity Books by Sevin (1965) and Goodman (1970, 1972) advised managers on how to derive the profit effect of marketing from an accounting perspective, and more academic writing tried to bridge the marketing–accounting and marketing–finance interfaces (Shapiro and Kirpalani 1984) When marketing researchers used performance as a dependent variable at all, they tended to focus on sales and market share as the key results

Sometime during the 1980s, nonfinancial perspectives began taking hold in both academic and management imaginations, beginning with both rigorous research and management success stories in the area of customer satisfaction From the late 1980s onward, new concepts in performance measurement ran riot Customer satisfaction, customer loyalty, and customer value management competed for attention as key intermediate performance figures that would ultimately lead to profits At the same time, brand-measurement research burgeoned and drew attention to other marketing assets as well Finally, the apparently paradigm-shifting impact of electronic commerce whipped measurement schemes into a frenzy of data, measures, and concepts

The Party Is Over

Unprotected by tenure, marketing managers' imaginations, if not their budgets, are being circumscribed Although the new measurement concepts of the 1990s have not disappeared, a faltering economy has driven managers into survival mode To paraphrase George Orwell, all measures are equal, but some measures are more equal than others, and financial survival drives an emphasis on financial measures

The marketing budget has traditionally been considered a possible source of spare change, but there are two reasons to believe that the cries of anguish emanating from marketing managers are worse this time First, as Sheth and Sisodia (1995) observe in a prescient article, previous recessions and new management practices have led to dramatic rationalization of manufacturing and administrative costs, meaning that the last big item on the income statement to squeeze is the marketing expense Second, the explosive growth of data and the market-research firms that provide them has changed the problem from a lack of data on marketing performance to the interpretation of vast quantities of data that just might provide a true understanding of the marketing–business performance link

What Is a Manager to Do?

Into this miasma of fear and loathing steps Tim Ambler, Senior Fellow at the London Business School and former Joint Managing Director at International Distillers and Vintners, which is now a unit of Diageo The second edition of Ambler's *Marketing and the Bottom Line* is an ambitious effort to "provide a complete guide to making marketing fully accountable" (p 3), especially to senior management The book examines a broad variety of potential measures, how to report marketing performance effectively to key audiences, and how to use measures to manage the marketing efforts of the organization Although the book is not perfect, it is far and away the best book for a senior manager who is interested in understanding marketing's impact on his or her organization

Marketing and the Bottom Line's thesis can be boiled down to five themes First, top management, not just top marketing management, has a fundamental obligation to measure the performance of marketing activities Ambler argues that understanding the future financial wealth of an organization requires understanding from where cash will come The primary provider of future cash flow is customers, so it is necessary to understand exactly how and why customers give organizations their money Allowing marketing to remain a black box is unacceptable both in terms of accountability to senior management and shareholders and in terms of organizational learning and growth This book, Ambler notes (p 3), "is not a paean of praise for marketing" Indeed, the book seems aimed at the board of directors and chief executive officer more than midlevel marketing managers (marketing executives may resist measurement precisely because understanding the effects of their budget can undermine justification of their budget), but marketing executives will still find the book useful in considering what they need to understand and how to report marketing upward in the organization

Second, financial measurement is not enough Although understanding the financial impact of marketing is important, it is insufficient on two grounds First, there is the problem that many income statement measures (e g , sales, profit) are fundamentally backward looking The income statement perceived in time t is the product of myriad marketing and other activities that stretch back years and sometimes decades and often reveals surprisingly little about what the income statement in time t + 1 will look like, as recent accounting scandals attest

Ambler argues that many of the popular financial methods to guide marketing (return on investment, shareholder value analysis, customer lifetime value) are seriously flawed in their application For example, disagreements among the valuation methods are often pedantic, in that they become debates about how to label cash flow within an organization He points out that valuation methods for different equities usually rely heavily on discounted cash flows For example, brand equity can be valued as the incremental cash flows a company would earn beyond those it would earn from an unbranded product Customer lifetime value similarly examines the total cash flow from a particular customer (or, more frequently, a customer segment) Market capitalization has long been considered a projection of overall future cash flows to the firm An organization's cash flow can be broken up on the basis of how much each brand brings in or how much each customer group brings in Either way, it is the same cash

Third, marketing performance is equal to the outcome of an organization's marketing activities in a given period, adjusted for change in the organization's underlying "marketing assets" Marketing activities have short- and long-term effects Scholars and practitioners have argued that the assets marketing creates for the corporation (e g , a strong brand) are too often ignored in the measurement of marketing performance (see Srivastava, Shervani, and Fahey 1998). For example, a promotion might increase sales in the current period but have damaging effects in the long run if it erodes brand equity. Conceptually, Ambler's means of dealing with the long/short distinction is to adjust short-term results for long-term effects on the assets that marketing has created for the organization. This is best done by using a blend of financial and nonfinancial and intermediate and final measures, taken over time and compared to organizational goals. Practically, this does not appear to be so much a quantitative adjustment (e.g., take profit and reduce by 10% because brand equity was damaged) as is the entirely appropriate analogy from financial analysis that changes in both the income statement (short-term activities) and the balance sheet (long-term capabilities) can be used to assess the health of the organization.

Fourth, strategically, the marketing asset represents the reservoir of future customer-based cash flow that has been built up by the firm's previous customer-related activities. Ambler construes the marketing asset broadly. It arises from multiple audiences (e.g., consumer, trade customer, employee, journalist, shareholder, supplier) and thus must be measured in multiple ways. A definition of total (marketing) equity, he avers (p. 42), would be "the sum of the equities in each stakeholder segment." He devotes chapters to brand equity, employee satisfaction, innovation, and investor relations as underlying components of the marketing asset. Given that there are vast research bases in each of these areas, experts in each might disagree with some of Ambler's arguments, but the overall approach is quite practical and managerial.

Fifth, measurement is equal to strategy is equal to management. Ambler effectively turns the aphorism "you can't manage what you can't measure" on its head, making a compelling case that whatever an organization is currently measuring is its strategy and correspondingly its management implementation. Measurement indicates and, in an emergent sense, drives the organization's strategy and implementation. In this sense, tightly controlled measurement is problematic. Ambler argues that tying executive bonuses to measurement is an invitation to counterproductive gaming. Close benchmarking of competitive measurement systems guarantees measurement uniformity in an industry and thus strategic uniformity.

I suspect that practicing managers will ignore this particular theme. The temptation to tie compensation to numbers is too well ingrained to resist in many organizations, and managers seem inordinately fascinated with the measurement schemes that other companies use. In the latter sense, managers will appreciate *Marketing and the Bottom Line* because it provides so many concrete examples of good measures and good measurement from both individual companies and benchmarking surveys.

The Research

The source material for *Marketing and the Bottom Line* is a broad swath of academic and benchmarking studies of marketing performance measurement. The first edition of the book was based heavily on the Marketing Metrics project in the United Kingdom, a 30-month research effort cosponsored by several marketing-practitioner institutions and the London Business School. The second edition broadens this base significantly, drawing on two major studies by the U.S.-based Marketing Leadership Council, Jean-Claude Larreché's Global Competitiveness project at INSEAD, and a host of more specialized studies from various academics and practitioners. Ambler also has conducted dozens of interviews with U.S. and U.K. executives to pin down specific examples of practice. Indeed, a drawback of the book is that it is sometimes hard to tell the exact scope of the underlying research. An appendix with a paragraph or two on each of the key research projects would have clarified the knowledge base significantly. The book still seems somewhat focused on the United Kingdom, partly because of the preponderance of U.K. firms among Ambler's examples. However, the range of U.S. and European examples (there is relatively little coverage of Asia) should not trouble executives in an increasingly global world.

The Marketing Asset Is an Elephant

In terms of measures, Ambler's treatment of the marketing asset is the most innovative part of the book. The breadth of his conception is both a strength and a weakness. While Amber discusses brand equity, he alludes to the tale of blind men each trying to identify an elephant by feeling one part of the animal. Strategically, it is clear that the sum of customer-related activities in an organization is as big as an elephant. Senior management will appreciate this book precisely because it steps aggressively across organizational boundaries. Marketing performance is not a marketing department issue but an issue that cuts across all customer-related parts of the organization.

Unfortunately, because the definition of the marketing asset is so broad, the reader may occasionally be hard-pressed to understand where the elephant ends. If the asset encompasses a half-dozen diverse stakeholders, their concerns, and all the activities that affect them, what part of the organization is *not* the marketing asset? The case is not helped by some idiosyncratic definitions of terms. When readers have become accustomed to the definitions, there is no problem, but the initial reading can be jarring. For example, brand equity is not specifically tied to a brand name but is defined (p. 34) as "any market-based asset, be it reputation, goodwill or customer satisfaction . . . even though the term 'brand' is not generally used by some sectors."

To be fair, Ambler claims that "brand equity" is the term companies most frequently used for the asset in his research, and he is also scrupulous in his examples to identify what each company calls the asset. Other definitions, though, are either more broad or narrow than a marketing reader might expect. Innovation refers (p. 132) to "management inspired changes that alter the firm's position in the market . . . [including] introducing new brands and products, finding new customer segments for existing products . . . or new ways of selling, [and] servicing or using the brand." The marketing mix is defined (p. 193) as "all expenditures intended to strengthen brand equity" and explicitly excludes spending on promotions and discounts under the assumption that these do not build brand equity.

Managing with Measures

Leaving aside the specific measures that senior management might use, an important strength of the book is its treatment of the management issues regarding marketing metrics Ambler describes a pattern of metrics evolution that is intriguing in its implications On the basis of his research, he posits five stages of evolution (pp 80–81) (1) Top management of the company is unaware of the issue of assessing marketing performance, (2) on becoming aware, management considers assessing marketing in terms of financial evaluation, (3) in response to the inadequacy of financial measurement alone, a multitude of nonfinancial measures are added to the financial ones, (4) the resulting company confusion leads to a streamlined set of financial and nonfinancial metrics that gives a coherent view of the market, and (5) mathematical modeling of a measure database provides a short list of predictive marketing metrics

The evolution appears to suggest a U-shaped relationship between the measurement stage and satisfaction with measures Because the company is blissfully ignorant in Stage 1, it is relatively satisfied Early attempts to value marketing financially lead to increasing frustration, and the many-measures stage probably represents a company nadir before satisfaction climbs again across the final two stages Ambler further suggests that not only is it difficult to shortcut this evolution, but it may not be advisable to try because it will limit the organization's ability to learn Furthermore, depending on data availability and industry sector, it may not be feasible for all organizations to progress to the fifth stage

Ambler provides voluminous advice on how to manage marketing metrics regardless of stage The book provides several sets of useful diagnostic questions to help managers understand their current situation and metrics needs Ambler dives into the details of managing measurement, is definite in his opinions, and is often quite witty in expressing them The book is full of provocative metaphors and vivid writing (I cannot remember the last time I laughed out loud, in a good way, while reading a marketing book)

Ambler clearly distinguishes the measurement problems of small and medium-sized enterprises as compared with large ones, though the book is definitely slanted toward large firms He devotes an entire chapter to the tension between developing and applying a single set of global metrics and creating strategy-specific measurement sets for different units, as in strategy maps (Kaplan and Norton 2000) I began this chapter firmly in the strategy-specific camp, and Ambler himself admires the tailored approach, but by chapter's end I found myself seduced by the logic underlying his general set of nine basic marketing metrics He provides enough detail, including useful diagnostic questions, to help the thoughtful manager pursue either approach

Ambler also diligently tackles the thorny problem of how to measure in multidivisional, multinational organizations, suggesting separate reporting for the key brand-market units (one brand in one market) that provide the bulk of an organization's shareholder value while relegating the remaining units to aggregate figures The book is similarly strong in discussing internal and external reporting issues

Sisyphus with a Spreadsheet?

Ancient Greeks told the tale of Sisyphus, who was eternally condemned in the afterlife to roll a boulder to the top of a hill, from where it would tumble back to the bottom only to be pushed up again Marketing performance measurement sometimes seems like just such futile labor It is difficult to identify the performance impact of any single marketing activity, much less marketing as a whole Given a sufficient sample size, statistical significance can be generated, but the R^2 or practical significance of a given variable is often low The teasing out of causality among the many factors that might affect overall performance is particularly challenging even with a large sample size Whether this is because of myriad interactions or because, ahem, no causal path exists between marketing and overall business performance is difficult to discern By the time researchers figure out what has happened, the market may have changed

The practical realities of organizational life also mitigate against strong measurement Given the "fire fighting," "solve-the-latest-crisis" mode that absorbs so much of management time, it will be difficult to devote attention to developing a measurement system when that distracts from tasks such as selling, advertising, and product development This is probably especially true in the current economic environment, which ironically is simultaneously creating greater pressure to justify marketing activities In discussing innovation, Ambler notes the paradox that whereas every company needs new initiatives, most managers are buried in what he calls "initiative overload," which leads to lower morale and probably poorer marketing A marketing metrics system will be one more big, ugly initiative on the organization's plate

Career incentives to do this measurement spadework are probably low The costs in time and money are immediate and concrete, whereas the benefits are distant and diffuse Ambler notes that even if senior marketing managers wanted to develop a strong metrics system, the time it might take probably exceeds their likely tenure in their positions Furthermore, performing companywide measurement well requires gathering often incompatible data from the four corners of the organization, which the chief marketing officer may not have the power to achieve Ambler suggests that a better course may be having the chief financial officer in charge of marketing metrics, since he or she is already accustomed to collecting and aggregating data from across the organization Although marketing managers may pale at this suggestion, it does have the virtue of moving the costs of measurement to the chief financial officer's budget Ambler also believes that it may give marketing metrics higher credibility, given the profession's reputation for being selective or manipulative with information At the least, a serious metrics system will need to be developed in consultation with the finance function to ensure comparability of units across financial and nonfinancial measures

"Pretty Good Measurement"

In 1991, the programmer Phil Zimmerman released an encryption software product called "Pretty Good Privacy" Basic in its functionality, the program would not stop dedicated snoopers, but it provided sufficient privacy to stop most attempts to read data in transmission, enough so that the U S government tried to prevent Zimmerman from exporting the product Ultimately, "pretty good measurement" is probably the best that can be done to understand marketing performance Even if perfect measurement is possible, by the time it is achieved, the strategy will have changed

Ambler adopts a similar perspective in describing what he calls "the fuzzy future" of marketing metrics Metrics can be considered as representing a mechanism for control (everything will occur as planned or it will be known why it did not) or direction (where is the firm and where should it be going?) Ambler suggests (p 237) that "fuzzy future" means that metrics should be used for "broad positioning rather than precision and for illumination rather than control" Rather than worry about precisely identifying the level of an organization's health, a firm should be able to sense whether it is getting sick or better Perfect alignment between strategy and measurement is not only infeasible but inadvisable as well, because it will cause the company to ossify rather than experiment and change

Ambler notes that in his research, some respondents found "fuzziness" in measurement uncomfortable, desiring the perfect alignment that an information technology–driven Balanced Scorecard dashboard seemed to promise Kaplan and Norton (1996), but others embraced a freer future He suggests that a balance between alignment and flexibility is the answer I agree

I recommended the first edition of this book to advanced MBAs and executives and will happily do the same with the second It is most suited for individual reading by senior managers at larger organizations, but it could be used as a text for a performance measurement seminar Although the book is occasionally idiosyncratic in approach, it has a strategic sweep and insight that will help any senior manager interested in measurement think through the relevant issues The many practical examples, measures, and implementation tips will maximize the likelihood of any measurement effort being a success In summary, although it is not perfect, this book is definitely "pretty good," and it is the best general book available on the topic

BRUCE CLARK
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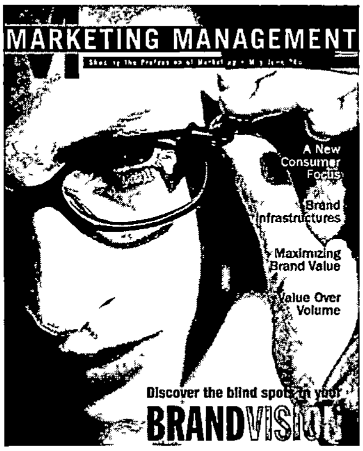

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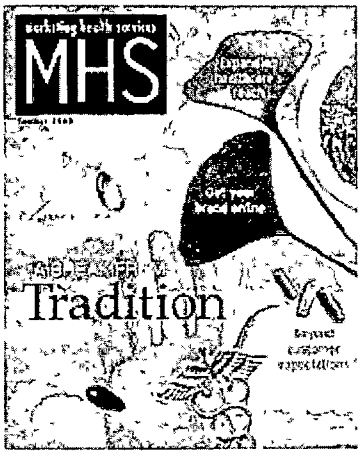

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The recipient of the 2003 Sheth Foundation/Journal of Marketing Award, which is funded through the American Marketing Association Foundation, is George S Day for his article, "The Capabilities of Market-Driven Organizations," which appeared in the October 1994 (Vol 58, No 4) issue of the *Journal of Marketing*

Nominations for the award were solicited from members of the *JM* Editorial Review Board, and a selection committee of past editors of AMA journals made the final selection The award carries both a plaque and a cash prize, which were presented at the American Marketing Association's Winter Marketing Educators' Conference, held February 6–9 at the Marriott Mountain Shadows Resort in Scottsdale, Arizona

The Sheth Foundation/Journal of Marketing Award, which was established through the generosity of the Sheth Foundation, honors articles published in the *Journal of Marketing* that have made long-term contributions to the discipline of marketing The criteria for selection include the quality of the article's contribution to theory and practice, the originality of the article, its technical competence, and the impact the article has made on the field of marketing Articles eligible for the award must have been published at least five years but not more than ten years earlier

•George S Day is Geoffrey T Boisi Professor of Marketing and Co-Director of the Mack Center for Technological Innovation, The Wharton School, University of Pennsylvania

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Michael D. Johnson & Fred Selnes

Customer Portfolio Management: Toward a Dynamic Theory of Exchange Relationships

Management of an entire portfolio of customers who are at different relationship stages requires a dynamic theory of exchange relationships that captures the trade-offs between scale economies and lifetime customer value This article contributes to the understanding of relationship management by developing a typology of exchange relationship mechanisms and a model of relationship dynamics and by simulating the model to provide guidelines for customer portfolio management An important insight from the research is that a key to the creation of value through closer relationships lies in bringing weaker relationships into a portfolio in the first place Another insight is that firms that position themselves toward offerings with low economies of scale, such as personal services, must build closer relationships to create value

The past half century has brought dramatic shifts in the underlying goals of marketing and strategic market planning In the decades of growth following World War II, economies of scale and scope were central, because profits were primarily a reflection of market share (Buzzell and Gale 1987) As markets throughout North America, Europe, and parts of Asia matured in the 1980s and into the 1990s, the lifetime value of customers became a central marketing goal (Fornell 1992) The increasingly global economy is now marked by large technology shocks, from such sources as the Internet and e-commerce, to the fields of biotechnology, information technology, and energy technology The result is a mix of mature and growth markets and their associated risks and returns, where the goal of a given firm's marketing strategy is not so clear These changes underscore the need for a theory of exchange relationships that encompasses the basic trade-offs between increasing market share to achieve economies of scale and the lifetime value of customers

"Offensive marketing" typically refers to activities aimed at increasing the size of a firm's customer base, and "defensive marketing" refers to activities aimed at existing customers, such as customer retention (Fornell and Wernerfelt 1987) and service recovery efforts (Smith, Bolton, and Wagner 1999) Current thought in marketing theory and practice is that defensive marketing has become more profitable, and the implication is that companies should allocate resources to build more cooperative and long-lasting relationships with their customers (Day 2000, Rust, Zeithaml, and Lemon 2000, Storbacka, Strandvik, and Gronroos 1994) We couch this argument in the larger question of how a firm should invest in an entire portfolio of relationships at different levels of cooperation to create value (Christopher, Payne, and Ballantyne 2002, Gummesson 2000, Hunt 2002) The relationship marketing literature recognizes the need to build portfolios of relationships or relational resources (Hunt 1977) to increase a firm's return on relationships (Gummesson 1994) However, as Hunt (2002) points out, there is significant ambiguity surrounding relationship portfolio decisions, because the portfolios are not selected at a particular point in time, rather, they take time to develop Therefore, investments in a customer portfolio should be a function of underlying firm, customer, and industry characteristics

In particular, customer relationship theories must grow to include the accumulated effect that the number of customers (i e , relationships) has on economies of scale and the resultant cost structure of competing firms This underscores the need to differentiate relationships on the basis of how value is created and to link value creation within individual relationships to overall value creation for a firm An important consequence is that offensive and defensive marketing strategies become more comprehensive concepts than has been previously considered As we argue subsequently, offensive marketing not only increases a customer base but also provides a basis for relationship development, whereas defensive marketing works not only to retain current customers but to create additional value with those customers through relationship development

The purpose of this article is to move relationship-management research toward a dynamic theory of how to build value for a firm across an entire portfolio of customer relationships We first develop a typology of exchange relationship mechanisms that captures fundamentally different forms of value creation The different forms are a function of customers' capabilities and problem-solving behavior as

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Vol 68 (April 2004), 1–17

well as suppliers' capabilities and resource-allocation decisions Because the different types of relationships imply different profit mechanisms, sellers' marketing strategies should encompass an entire portfolio of customers at different relationship levels We refer to this process as "customer portfolio management" We then introduce a model of customer portfolio lifetime value (CPLV) that links value creation within individual customer relationships with overall value creation for a firm The model provides a basis for understanding when and when not to grow relationships Finally, we use the framework, model, and simulation to develop a series of postulates and propositions regarding the dynamics of customer portfolios and portfolio management We begin by developing a theoretical framework that connects customer–supplier relationships to industry factors and societal institutions The framework takes a dynamic approach that extends existing theories of competition in marketing (Alderson 1965, Dickson 1992, Hunt and Morgan 1995, 1996) and provides the basis for our relationship typology and CPLV model

Toward a Theory of Exchange Relationships

In general, marketing scholars agree that the fundamental phenomenon to be explained, predicted, and controlled in the dynamics of the marketplace is the exchange relationship (Bagozzi 1975, Hunt 1976, 1983, Kotler 1972) The purpose of an exchange relationship is to connect a customer's needs with a supplier's resources and offerings We use the terms "customer" and "supplier" herein to apply to both business-to-consumer and business-to-business relationships From a supplier's perspective, value creation is a process of understanding the heterogeneity of customer needs, developing products (goods and services) to fill those needs, and matching customers to products through marketing activities in competition with other suppliers (Alderson 1957, 1965, Reekie and Savitt 1982) From the customer's perspective, the customer chooses the supplier or suppliers that provide the highest expected benefits less any associated costs and risk, where benefits encompass a bundle of qualities, processes, and/or capabilities (Murphy and Enis 1986)

At a basic level, an exchange relationship serves its purpose when the customer has received the product and paid for it However, in some relationships, the customer and the supplier collaborate, share information, socialize, integrate or link activities, and even commit future resources to the relationship Relationships are formed to create economic value more effectively than what may be achieved through the market (price) mechanism This phenomenon is by no means new, either in the marketplace or in economic theory In 1937, Coase had already referred to forming relationships in those cases in which short-term contracts would be unsatisfactory (e g , with services and labor) Richardson (1972) argued that relationships in the form of *ex ante* cooperation are more likely, even necessary, when the activities of the buyer and the seller are complementary but dissimilar

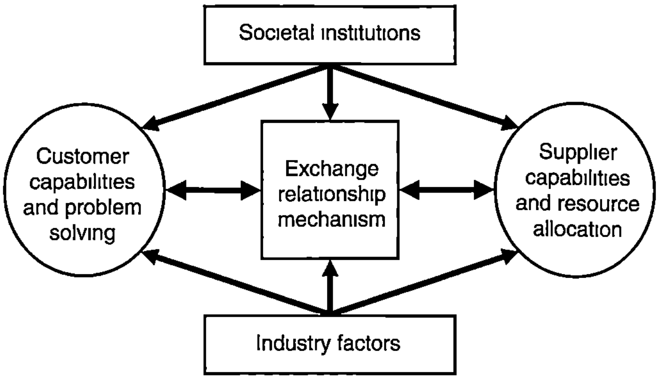
Following these arguments, we define an *exchange relationship* as a mechanism for creating value through the coordination of production, consumption, and related economic activities between a customer and a supplier There are various exogenous factors that influence how value is created in exchange relationships In this article, we explore in detail how firm, customer, and industry factors are likely to affect economic activity organized in relationships Our exchange relationship framework is presented in Figure 1 The central concept in the framework is the nature of the exchange relationship mechanism The value created in an exchange relationship is a direct function of both the customer's and the supplier's capabilities and strategies

The strategy of the customer in the market-matching process is to know when and where to solve problems (Howard 1977, 1983, Murphy and Enis 1986) to identify the supplier that is perceived as the best in terms of overall benefits less the costs and risks involved This problem solving has historically been linked to discrete product decisions (transactions) We propose that customer problem solving be conceptualized more broadly to include implicit or explicit relationship decisions, that is, a customer evaluates both the expected benefits versus the costs of a given relationship (versus the same relationship with other suppliers) and the benefits versus the costs of alternative forms of that relationship A customer's capability to evaluate these tradeoffs affects his or her ability either to convert to a closer relationship or to change suppliers Customers' motivation to solve problems is a direct function of the homogeneity versus the heterogeneity of demand (Alderson 1965) The more heterogeneous the demand, the greater is the benefit of finding an alternative that better fits customer needs relative to the costs and risks incurred

The strategy of the supplier in this exchange relationship is to provide an offering and to organize resources to match the needs of the market to create the best return on investment and a sustainable competitive advantage (Day 1997, Dyer and Singh 1998) We propose and subsequently describe three different strategies for how customer value is created to accomplish these goals parity value, differential value, and customized value

A firm's efforts to evaluate the relative value of different exchange relationships occur within a dynamic competitive environment in a state of constant change (Day and Wensley

FIGURE 1
Exchange Relationship Framework


Societal institutions
Customer capabilities and problem solving
Exchange relationship mechanism
Supplier capabilities and resource allocation
Industry factors

1988, Dickson 1992, Hayek 1978, Hunt and Morgan 1995) Industry factors naturally directly affect customer capabilities and problem solving, supplier capabilities and resource allocation, and the exchange relationship mechanism The direct effects of industry factors in Figure 1 capture the influence of an industry's norms and opportunities as exogenous variables, or "rules of competition," that come with competing in a particular industry (Porter 1985), as when economies of scale are high or low Similarly, societal institutions capture the customs, laws, and institutions of society in general (North 1990) that influence exchange relationships For example, public service agencies and utilities are often required by law to serve segments of customers that are not profitable The indirect effects of industry factors and societal institutions on exchange relationships capture the factors that influence customers' or suppliers' benefits, costs, and risks of entering or maintaining a relationship

The development of an exchange relationship also depends directly on the ability and motivation of both the customer and the supplier to participate For example, when a supplier wants to move a relationship to a higher degree of commitment, the move is contingent on the customer's willingness and ability to contribute Therefore, in an understanding of exchange relationships, both sides must be understood simultaneously At the same time, the exchange relationships that exist or evolve in the marketplace have some effect on what customers and suppliers do Thus, we posit a reciprocal relationship between both customer and supplier decisions and the exchange relationship mechanism in Figure 1

Several researchers in marketing have addressed differences among exchange relationship mechanisms and have proposed typologies based on, for example, the differences between products and services (Berry 1980, Shostack 1977), the degree and form of collaboration (Day 2000, Heide 1994), industrial versus consumer markets (Webster 1978), and the potential value of a firm's customer portfolio (Dickson 1983, Fiocca 1982, Krapfel, Salmond, and Spekman 1989) In the context of our framework and discussion, it is more parsimonious to focus on differences in how value is created (i e , the mechanism for coordination of production, consumption, and related economic activities between a customer and a supplier) We subsequently present three types of relationships acquaintances, friends, and partners The labels in this typology are similar to those in the work of Krapfel, Salmond, and Spekman (1989), but the definitions are different

Our goal is to link value creation at the level of the individual relationships with value creation for the firm as a whole The individual relationships are building blocks for understanding the value created across an entire customer portfolio Although individual exchange relationships are primarily economic relationships in our typology, they retain social meaning As relationships evolve from acquaintances, to friends, to partners, the trust and commitment in these relationships suggests that the social mechanism for creating economic value changes However, unlike purely social relationships, customers and suppliers are likely to dissolve any form of exchange relationship if the economics of the relationship thus dictate

From Strangers to Acquaintances

Strangers are customers and suppliers in a preawareness and/or pretransaction period At the industry level, strangers may be conceptualized as customers that have not yet entered the market At the firm level, they may include customers of competing suppliers As soon as there has been a transaction in which awareness and trial are achieved (Ehrenberg 1972), a minimum of familiarity is established, the supplier and customer become acquaintances, and an exchange relationship is established In this case, suppliers need only provide a value proposition to customers that is on par with competitors, or parity value Through replication of processes and accumulated volume, suppliers gain experience, learn to improve production efficiencies, and gain a cost advantage relative to those with less experience and volume (Ettlie 2000, Porter 1985)

For a customer, an acquaintanceship is effective as long as the supplier provides the product in a satisfactory way at a price that is perceived as fair With repetitive interaction, the customer gains experience and becomes familiar with the supplier's products and services This reduces uncertainty about expected benefits and costs of continuing the relationship and thus enhances the relative attractiveness of the supplier relative to other suppliers (Hoch and Deighton 1989) Repetitive interaction creates familiarity with the customer, which facilitates marketing, sales, and service Thus, an acquaintance relationship facilitates transactions primarily through the reduction of a customer's perceived risk and a supplier's costs

Given the nature of acquaintanceships and their focus on parity value, standardization, and repetition, the potential for a firm to develop a sustainable competitive advantage through relationship activities is limited However, competitors can create value through acquaintances, which is difficult to imitate, by learning from the transactions as a whole For example, Amazon com has created value even with acquaintances through a highly developed order and sales system By processing and organizing historical idiosyncratic transaction data from a customer and comparing it with data from other customers, the system is able to generate cross-selling opportunities

From Acquaintances to Friends

A major tenant of dynamic theories of competition is that competitors are constantly trying to adapt to changing customer needs (Alderson 1965, Dickson 1992, Hunt and Morgan 1995, 1996) As a result, suppliers diversify their product portfolios to target both old and new customer segments with differentiated offerings (Buzzell 1966) and superior value propositions (Best 2000) The key to the creation of value and profit is no longer just parity, standardization, and repetitive operations, it is also convincing customers to pay a premium for superior performance

A firm's potential to develop sustainable competitive advantage through friendships should be higher than for acquaintances Because the offering is more unique and the customer comes to trust that uniqueness, a competitive advantage is created The activities that link customer and supplier are also more unique and more difficult to imitate, especially as they grow into a series of linked activities

(Gustafsson and Johnson 2003) For example, IKEA is an international furniture retailer that creates value for both customers and suppliers through a series of linked activities that include low-cost manufacturing, in-house design, and direct involvement of customers in the service, selection, and assembly activities

As suppliers move from supplying parity value to differential value, the exchange relationship transforms from acquaintance to friendship Psychologically, the transition from acquaintanceship to friendship requires the development of trust in the relationship (Morgan and Hunt 1994), be it to a brand, an individual (e g , a service provider), or an entire organization (e g , industrial buying) Customers not only become familiar with a particular supplier or suppliers but also come to trust that the supplier provides superior value Suppliers provide a diversified product or products that meet the needs of a particular market segment better than competitors A natural consequence is that customers require more information, as through advertising and word of mouth The customer also provides more information to the supplier (e g , in the form of market research) to enable suppliers to identify changes in customers needs, communicate them through the organization, and use the information to improve products and services (Kohli and Jaworski 1990, Narver and Slater 1990)

From Friends to Partners

Not captured thus far in our typology is a partnership that reaches the level of *ex ante* cooperation and coordination of production and supply Research on industrial buyer behavior provides the psychological foundation for understanding the transition from friends to partners In their commitment–trust theory of relationships, Morgan and Hunt (1994) argue that the longevity, level of cooperation, and acquiescence in an exchange relationship are predicated on not just trust but also relationship commitment Drawing on research both inside and outside of marketing (Cook and Emerson 1978, Moorman, Zaltman, and Deshpandé 1992), Morgan and Hunt define commitment as "an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it" (p 23)

The collaborative coordination of complementary activities (Coase 1937, Richardson 1972) requires suppliers to provide more customized value, which has several implications for how the relationship should be managed (Cannon and Perrault 1999, Heide 1994) Suppliers must use customer knowledge and information systems to deliver highly personalized and customized offerings to create the highest level of congruence between the heterogeneity of demand and supply (Edvardsson et al 2000) The key to profitability becomes a supplier's ability to organize and use information about individual customers more effectively than competitors Customers benefit from suppliers whose customer knowledge and information systems enable them to deliver highly personalized and customized offerings (Huffman and Kahn 1998, Pine and Gilmore 1998, Pine, Peppers, and Rodgers 1995) However, customers must be willing to pay a price premium or to commit themselves to the supplier for an extended period of time (Van de Ven 1976, Williamson 1983) Over time, the relationship may evolve through continuous adaptation and commitment (Dwyer, Schurr, and Oh 1987, Johanson, Hallén, and Seyed-Mohamed 1991), and the parties may become increasingly interdependent The relationship may advance from having only a matching purpose to becoming a source of sustainable competitive advantage (Dyer and Singh 1998, Hunt 1997, 2002, Selnes and Sallis 2003)

That trust is a necessary but not sufficient condition for partnerships is consistent with Spekman's (1988) argument that trust provides a platform or "cornerstone" from which more long-term commitments are built Similarly, Morgan and Hunt (1994) theorize that the creation of trust leads to the creation of commitment This follows from social exchange theory and its concept of generalized reciprocity (McDonald 1981), which holds that trust breeds trust, which ultimately increases commitment and results in a shift from short-term exchanges to long-term relationships In support of the theory, Morgan and Hunt (1994) and Moorman, Zaltman, and Deshpandé (1992) find that trust has a significant effect on relationship commitment and resultant loyalty among industrial customers Commitment is also a necessary condition for customers to extend the time perspective of a relationship (Spekman 1988) Just as a customer's trust in brand concepts enables friends to purchase products routinely yet in an arm's-length way, the deepening of trust and the establishment of commitment further reduce the customer's need to solve problems in the traditional sense of "finding a better alternative " This trust and commitment are not limited to business-to-business contexts Johnson and colleagues (2001) find that relationship commitment plays a direct role in building end-user loyalty as well

Table 1 summarizes our exchange relationship typology and the basic arguments about how value is created in the different types From a customer's problem-solving perspective, the formation of satisfaction, trust, and commitment corresponds to the customer's willingness to engage in an exchange relationship as an acquaintance, friend, and partner, respectively From a supplier's resource-allocation perspective, the delivery of parity value, differential value, and customized value corresponds to the supplier's ability and motivation to create an acquaintance, friend, or partner The implication is that as customers make the transition from satisfaction-based acquaintanceships to trust-based friendships to commitment-based partnerships, we expect that both the value and the length of cooperation increase

Relationship Development and Switching Behavior

Our framework and typology suggest that customer relationships progress over time to closer and closer forms of value creation, though there are individual cases in which the progression of relationships is different A relationship between a supplier and a customer may be established directly at a friendship level without progressing through the acquaintance stage Customers may move from being acquaintances with one supplier to friends with another supplier because the competitor's offering has a superior value proposition Here, the trust required of friendships may be

TABLE 1
A Typology of Exchange Relationships

	Acquaintances	Friends	Partners
Product offering	Parity product as a form of industry standard	Differentiated product adapted to specific market segments	Customized product and dedicated resources adapted to an individual customer or organization
Source of competitive advantage	Satisfaction	Satisfaction + trust	Satisfaction + trust + commitment
Buying activity	Satisfaction facilitates and reinforces buying activity and reduces need to search for market information	Trust in supplier is needed to continue the buying activity without perfect information	Commitment in the form of information sharing and idiosyncratic investments is needed to achieve customized product and to adjust product continuously to changing needs and situations
Selling and servicing activities	Familiarity and general knowledge of customer (identification) facilitates selling and serving	Specific knowledge of customer's connection to segment need and situation facilitates selling and serving	Specific knowledge of customer's need and situation and idiosyncratic investments facilitates selling and serving
Acquisition costs	Low Generally low but depends on industry factors such as market growth, satisfaction with competing alternatives, distribution, and media availability	Medium Acquisition and/or conversion costs increase with degree of differentiation in product (perceived risk), established preferences for competing alternatives, and availability of segment specific channels and media	High Acquisition and/or conversion costs increase with degree of customization and level of idiosyncratic investments from one or both sides
Time horizon	Short Generally short because the buyer can shift supplier without much effort or cost	Medium Generally longer than acquaintance relationships because trust in a differentiated position takes a longer time to build and imitate	Long Generally long because it takes time to build and replace interconnected activities and to develop a detailed knowledge of a customer's need and the unique resources of a supplier to commit resources to the relationship
Sustainability of competitive advantage	Low Generally low, but competitors can vary in how they build unique value into selling and serving even if the product is a form of industry standard	Medium Generally medium but depends on competitors' ability to understand heterogeneity of customer needs and situations and the ability to transform this knowledge into meaningful, differentiated products	High Generally high but depends on how unique and effective interconnected activities between customer and supplier are organized

acquired not through direct experience but through brand building, personal selling, and so forth Customers may also move directly to the partnership level, such as when an industrial customer decides to outsource its information technology or customer service activities completely to a partner with which it has no previous experience

However, at an aggregate level, we assume that a supplier's customers move progressively from strangers, to acquaintances, to friends, to partners This is consistent with the evolution of market growth as it relates to the diffusion of innovation within a product life cycle (Mahajan, Muller, and Bass 1995) A natural consequence of market growth is that customer demand becomes more heterogeneous as a wider variety of customers (and customer needs) emerges (Dickson 1992) In response to this heterogeneity, firms constantly innovate, putting forward alternative systems, service processes, and products to create value for and to attract customers (Day and Wensley 1988) Thus, as markets grow, we expect to observe the emergence of differentiated and customized products with a mix of relationships that include an increasing number of friends and partners over time

The likelihood of observing this progression of relationship levels should vary by firm, customer, and industry The greater the lifetime values of customers, the more incentive the suppliers have to pursue closer relationships The more that sellers segment the market to meet particular customer needs, the more incentive customers have to pursue closer relationships The more intense the competition in any particular segment, the more customers are likely to switch because of the abundance of substitutes For example, consider cases in which both the costs of market entry and the value of building close relationships are high This might describe technologically intensive industries in which customers and suppliers benefit significantly from close cooperation Although the probability of any given firm being able to create acquaintances is low, as a result of entry barriers, the probability of moving the acquaintances to become partners may be higher In contrast, consider cases in which both the costs of entry and the benefits of partnership are both low, such as in Internet retailing In this case, it may be easier to create acquaintances than to move customers to a friendship or partnership stage

On the basis of our typology, we believe that this relationship progression should systematically affect both the propensity for customers to switch and the costs incurred either to gain customers from competitors or to move them to an even closer relationship The strength of a closer relationship creates a stickiness that lowers the probability of customer switching (Bendapudi and Berry 1997, Johnson et al 2001) Customers simply have a diminishing need to solve problems or to shop around Closer relationships also increase the costs that a competitor incurs to induce switching at a given relationship level (Fornell 1992, Fornell and Wernerfelt 1987) The costs of converting a customer from level to level should similarly increase as customers move from being strangers to being acquaintances, friends, and partners The cost increases are directly related to the creation of parity value, differential value, and customized value (as is shown in Table 1) and, at a general level, the relationship-specific investments incurred when a firm seeks closer customer relationships (Bendapudi and Berry 1997, Williamson 1981) Thus, the costs of converting customers to a higher-level relationship or gaining customers from competitors at a given level should increase, and the probability of switching should decrease as customers progress from strangers to acquaintances, to friends, to partners Closer relationships also create premium value for firms, which is a basic tenant of the customer lifetime value (CLV) argument (Fornell et al 1996, Gummesson 2002, Rust, Zeithaml, and Lemon 2000) It has been argued that customers that are closer to the firm tend to buy more (because they are better acquainted with the firm's offerings), cost less to serve (because the firm knows them better), and are less price sensitive (because they have higher switching costs, Libai, Narayandas, and Humby 2002)

We state our arguments about the dynamics of the relationship typology as a series of postulates Our arguments about switching probabilities and relationship costs and premiums are stated formally as follows

> Postulate 1 As customers progress toward a closer relationship with suppliers, (a) the probability of customers switching to competitors decreases, (b) the costs of gaining customers from competitors at a given relationship level increase, (c) the costs of converting customers to an even closer relationship increase, and (d) revenue premiums increase

Firms differ in their resources and resulting marketing capability to learn and to create a competitive advantage with respect to the costs and probabilities of attracting customers and developing relationships (Baker and Sinkula 1999, Day 1984, 2000, Hunt and Morgan 1995, 1996) Some suppliers are simply better at adapting to the heterogeneity of customer demand over time by learning from customers and competitors and by implementing what they learn (Dickson 1992) The relational view of developing competitive advantage identifies relationship learning (e g , interfirm knowledge sharing) as an important avenue for the creation of differential relationships and "supernormal" profits in relationships (Dyer and Singh 1998, Pine, Peppers, and Rogers 1995, Selnes and Sallis 2003) A firm's capability to learn from and about its market and customers has several direct implications for relationship development and how value is created in its customer relationships, which we state formally as follows

> Postulate 2 The stronger the dynamic marketing capabilities of a firm, (a) the lower is the probability that a customer will switch to competitors, (b) the higher is the probability that a customer will switch from competitors, (c) the higher is the probability of converting customers to closer relationships, (d) the lower is the cost of converting customers to closer relationships, and (e) the higher is the revenue premium from closer relationships

Aside from market growth and the heterogeneity of demand and supply that follow, one of the most important industry factors that affects value creation is economies of scale (Porter 1985, 1995) Economies of scale relate to the generation of market-level efficiencies through increased volume (Best 2000, Milgrom and Roberts 1992) The process and production efficiencies gained through accumulated production and resultant knowledge lead to a drop in cost per transaction or unit sold, which decreases at the margin over time From a customer portfolio standpoint, this creates a fundamental resource-allocation trade-off for managers Should resources be allocated to create simple transactions and growth as a means of leveraging systemwide economies of scale, or should resources be allocated to build relationships through cooperation to increase the lifetime value of customers?

These economies of scale should directly affect the attractiveness of different types of customers in a customer portfolio In industries in which economies of scale are large (e g , a manufacturer of commodity goods), there should be greater value created by just having customers in the portfolio, even if they are on-again/off-again acquaintances In industries in which economies of scale are much smaller, the creation of closer relationships that leverage the lifetime value of customers should be more important For example, the larger the service component of a product offering, the lower are the economies of scale Because services are more customized to individual needs and involve the human resources of the firm, it is more difficult to increase quality without lowering productivity (Anderson, Fornell, and Rust 1997, Huff, Fornell, and Anderson 1996) However, even service industries vary in their degree of scale effects, such as when self-service technologies bring some efficiency to particular service activities (Edvardsson et al 2000) Another straightforward implication of increased economies of scale is that the overall value of a customer portfolio (i e , CPLV) should increase as a result of cost reduction We state the dynamics regarding economies of scale as follows

> Postulate 3 As the scale advantages of growth in a market increase, (a) overall CPLV increases, and (b) the contribution of distant relationships increases relative to closer relationships

CPLV

How should firms allocate resources to attract customers and move relationships to higher forms of value creation to maximize profits and develop a sustainable competitive advantage? The answer to this question requires an understanding of the dynamics of value creation and the profitability of the different types of relationships over time In every market period, firms must decide whether to incur the costs required to create acquaintances through parity value, friends through differential value, and partners through customized value We do not consider discounted cash flows here for several reasons The first is to keep the defined time period open to accommodate both relatively short and relatively long product life cycles (e g , high-technology versus low-technology products, Ettlie 2000) The second reason is to keep the model and discussion as parsimonious as possible Finally, the impact on our model is straightforward As relationships take time to develop, a discount factor simply decreases the value of closer relationships with respect to distant relationships

In the following sections, we develop a model of CPLV and a set of propositions that capture how the market dynamics and firm capabilities in Postulates 1–3 affect the evolution and value of a supplier's customer portfolio of relationships over time We use a series of logical experiments, or simulations, to operationalize the CPLV model under various conditions We produced values of the different parameters used in the simulation, we did not take them from any particular market or markets In accordance with Moorthy (1993), the focus in theoretical modeling is on internal validity The purpose is to construct an environment, or model, in which actions take place In this sense, our simulations do not test the theory per se Rather, they operationalize the theoretical model, or "produce the effects by logical argument," and thus help the researcher "construct cause–effect explanations of marketing phenomena" (Moorthy 1993, p 94) Although the testing of our postulates or assumptions and resulting propositions is beyond the scope of this research, they are ultimately tested by their predictions in different areas of applicability

The CPLV Model

Marketing scholars have devoted considerable attention in recent years to operationalizing and estimating CLV models, which examine expected profits over time for individual customers (Blattberg, Getz, and Thomas 2001, Gupta and Lehmann 2003), new versus existing customers (Hogan, Lemon, and Rust 2002), and market segments (Libai, Narayandas, and Humby 2002) The overriding emphasis in these models is how to increase the lifetime value of individual customers as assets (Hogan, Lemon, and Rust 2002, Hunt 1997) Although we use this as a foundation, our point of departure is that we focus on value created through an entire portfolio of customers at different relationship stages over time, or CPLV

The problem for any given supplier s is to maximize CPLV as the sum of the value of acquaintances (A), friends (F), and partners (P) To specify CPLV more explicitly for a given firm over time, we first specify the total number of acquaintances (A_{st}), friends (F_{st}), and partners (P_{st}) for supplier s at time t as follows

$$(1)\qquad A_{st} = A_{st-1} + A_{st\,\text{Converted}} + A_{st\,\text{Gained}} - A_{st\,\text{Lost}} - F_{st\,\text{Converted}},$$

$$(2)\qquad F_{st} = F_{st-1} + F_{st\,\text{Converted}} + F_{st\,\text{Gained}} - F_{st\,\text{Lost}} - P_{st\,\text{Converted}}, \text{ and}$$

$$(3)\qquad P_{st} = P_{st-1} + P_{st\,\text{Converted}} + P_{st\,\text{Gained}} - P_{st\,\text{Lost}},$$

where the subscripts "Converted," "Gained," and "Lost" denote relationships converted from one level to another, relationships gained from the competition at a given level, and relationships lost to the competition at a given level for supplier s at time t, respectively Thus, $A_{st\,\text{Converted}}$ is the number of strangers new to the market that are converted to acquaintances, and $A_{st\,\text{Gained}}$ is the number of competitors' customers gained as acquaintances by supplier s at time t Equations 1–3 take into account a supplier's ability to create closer relationships, the gain and loss of customers at a given level (i e , switching behavior), and the attrition of customers to higher-level relationships To estimate the value of overall CPLV for supplier s at time t, we must also define parameters to capture the relative costs and revenues involved, where

UC_{st} = unit cost for supplier s at time t,
CR_{st} = base customer revenue for supplier s at time t,
FP_{st} = friendship premium for supplier s at time t,
PP_{st} = partner premium for supplier s at time t,
$AC_{st\,\text{Conversion}}$, $FC_{st\,\text{Conversion}}$, and $PC_{st\,\text{Conversion}}$ = acquaintance, friend, and partner cost of conversion, respectively, for supplier s in time t, and
$AC_{st\,\text{Gaining}}$, $FC_{st\,\text{Gaining}}$, and $PC_{st\,\text{Gaining}}$ = acquaintance, friend, and partner cost of gaining, respectively, for supplier s in time t

The unit cost figure is a percentage of the economies of scale for the industry, based on a firm's market share. The costs apply to every customer in the portfolio. The base customer revenue similarly reflects the revenues that apply to every customer in the portfolio, and the premiums for converting customers to friendships and partnerships are the marginal profit (additional ongoing revenue – additional ongoing cost) captured as a result of moving customers to closer relationships. Finally, the costs of conversion and gaining represent the costs of moving a customer to a closer relationship and enticing customers to switch from a competitor, respectively.

The overall value of CPLV is the number of customers at each relationship stage multiplied by the total revenues less costs for each customer, less the costs attributed to converting and gaining customers, all aggregated over a defined time period n. Specifically:

$$(4)\quad \text{CPLV} = \sum_{t=1}^{n}[A_{st}(CR_{st} - UC_{st}) - (A_{st\ \text{Converted}} \times AC_{st\ \text{Conversion}}) - (A_{st\ \text{Gained}} \times AC_{st\ \text{Gaining}})]$$
$$+ \sum[F_{st}(CR_{st} - UC_{st} + FP_{st}) - (F_{st\ \text{Converted}} \times FC_{st\ \text{Conversion}}) - (F_{st\ \text{Gained}} \times FC_{st\ \text{Gaining}})]$$
$$+ \sum[P_{st}(CR_{st} - UC_{st} + PP_{st}) - (P_{st\ \text{Converted}} \times PC_{st\ \text{Conversion}}) - (P_{st\ \text{Gained}} \times PC_{st\ \text{Gaining}})]$$

Certain implications for portfolio management follow directly from the CPLV model per se. For example, the costs associated with inducing a customer either to switch from a competitor or to move to a higher-level relationship should have little impact on the relative contribution of acquaintances, friends, and partners over time. Although changes in the costs affect short-term contributions during periods of significant relationship growth, the costs occur only when a given customer converts to a closer relationship or switches from a competitor. In contrast, base customer revenues and relationship premiums are captured for every period that customers are retained. Thus, the cost of either converting customers to higher-level relationships or gaining customers from competitors at a given level have little long-term effect on CPLV, unless the costs are categorically higher than the revenues and premiums. This is consistent with the argument that the costs incurred to gain customers pale in comparison to the revenues that customers generate over time (Fornell et al. 1996; Reichheld 1996).

Operationalizing a Baseline Scenario

How do the dynamics of the CPLV model actually play out? To gain insight into the model's implications, we conducted a series of simulations to operationalize the model. For brevity, we report only a few of the simulations here so as to highlight the more interesting insights. We develop a baseline scenario (Scenario 1) against which we simulate variations in firm, customer, and industry characteristics through assigning a set of parameters different values. This yields a series of propositions as to how particular firm, customer, and industry characteristics affect CPLV. Our simulations operationalize CPLV for supplier s using Equation 4. On the basis of our postulates and the CPLV model, we operationalize the following parameters: (1) market growth over time, (2) changes in unit costs over time, (3) the cost of converting customers from one relationship level to another, (4) the cost of gaining customers from competitors at a given relationship level, (5) the relationship premium or value created at different relationship levels, (6) the probability of converting customers from one relationship level to another, and (7) the relative probability of gaining versus losing customers from competitors at a given relationship level. The relationship conversion and switching probabilities enable us to determine the total number of acquaintances (A_{st}), friends (F_{st}), and partners (P_{st}) for supplier s at time t (i.e., Equations 1–3) as input to Equation 4.

We examined differences in market growth over time within a product life cycle that moves toward one million units sold over 100 market periods. We assume that there is a straightforward diffusion curve for each scenario in our simulation. The quantity sold in period t or Q_t is

$$(5)\qquad Q_t = Q_{max}/(1 + e^{-(a + bt)}),$$

where Q_{max} is one million units and a and b are constants, which we set at –5 and .15. This yields sales levels over time that follow a logarithmic S-shaped diffusion process (Mahajan, Muller, and Bass 1995) in which there is no extended "time to take off" and some period of market maturity. This enables us to observe differences as the market evolves from introduction, to growth, to maturity. We keep this market growth constant across all scenarios.

Economies of scale represent industry learning related to the reduction in unit costs with market growth. Unit cost at time T (UC_t) varies as follows:

$$(6)\qquad UC_{st} = UC_{\text{minimum}} + UC_{\text{decrease}}/(c + dQ_{st}),$$

where UC_{minimum} is the minimum possible unit cost, UC_{decrease} is the asymptotic decrease in unit cost over time, Q_t is the industry unit sales volume (from Equation 5), and c and d are constants. In each learning curve, the unit cost is set at a value of \$100 ($UC_{\text{minimum}} + UC_{\text{decrease}} = \$100$). In the baseline scenario, unit costs decrease asymptotically from \$100 to \$50 over the course of the product life cycle ($UC_{\text{minimum}} = \$50$, $UC_{\text{decrease}} = \$50$). Note that the unit costs apply to the industry (product life cycle) as a whole. We operationalize an individual supplier's unit cost savings as a percentage of industry unit cost savings based on the supplier's market share at time t.

Marketing dollars are required to build relationships and associated internal resources to move customers from strangers, to acquaintances, to friends, to partners (Fornell and Wernerfelt 1987). Recall that customer problem-solving decisions include the decision of whether to move the relationship with a supplier to a higher level. Because customer risks and resource sharing increase as a relationship grows, it should be more expensive to convince a customer to become a partner than to become a friend or acquaintance. In the baseline scenario, the acquisition cost of converting a customer to an acquaintance, friend, and partner is \$100, \$150, and \$200, respectively. Suppliers also incur some cost associated with gaining customers from competitors at a given relationship level, that is $AC_{st\ Gaining}$, $FC_{st\ Gaining}$, and $PC_{st\ Gaining}$ (acquaintance cost of gaining, friend cost of gaining, and partner cost of gaining for supplier s at time t) in Equation 4 In the baseline scenario, we set this cost equal to $100, $200, and $300, respectively, positing that it should be more expensive to switch a customer from competitor to competitor than it is to create a closer relationship with a customer already in the portfolio

When a customer moves from being a stranger to an acquaintance, supplier s receives a base customer revenue (CR_{st} in Equation 4) in each time period that the customer is retained Following the relationship typology logic in Table 1, when customer demand is met through differentiation, friendships are formed, which yields a friendship premium for the supplier (FP_{st}) When customer demand is met through an even greater investment in customization, partnerships are formed, which yields a partnership premium for the supplier (PP_{st}) We held the base revenue for acquaintances, friends, and partners constant at $100 across scenarios In the baseline scenario, moving a customer to become a friend and partner adds a premium of $25, such that the overall customer revenue (not including unit cost) equals $100, $125, and $150 for acquaintances, friends, and partners, respectively

To operationalize the CPLV model, we needed to make an assumption about the probability that a supplier is able to convert a customer to a closer relationship We set this probability to 25 in the baseline scenario We make other simplifying assumptions at this point Our market growth curve in Equation 5 defines how many customers are in the market at a given point Using a spreadsheet database, the simulation multiplies the number of new customers entering the market in a period by a supplier's probability of creating acquaintances This probability determines the share of new customers entering the market that are acquaintances of supplier s at time t Competitors acquire all remaining acquaintances that are entering the market at time t We then take into account that the market-matching process requires some minimum time period before customers are in a position to move to a higher relationship For example, it takes time for customers to solve problems and for suppliers to allocate resources to create differential and customized value The simulation assumes that it takes a minimum of 10 market periods for any customer either to transition to a closer relationship with the same supplier or to switch to the same type of relationship with a different supplier In our preliminary tests of the simulation, we also set the minimum time equal to 20 market periods, and we found that the pattern of results was robust

We also made an assumption about competitors After being an acquaintance for ten periods, there is some probability that a customer is converted to a higher-level relationship, is lost to the competition, or remains at the current relationship level (where the sum of the probabilities of converting and losing customers must be less than or equal to one) To calculate the total number of customers at any given relationship stage for supplier s, the simulation first determines the number of customers that competitors have at each relationship stage at time t To make this determination, we assume that the competitors' probabilities of creating friends and partners are equal to 25, which is the baseline level of the probabilities for our target supplier s This enables us to simulate situations in which the target supplier's probabilities and the competitors' probabilities are equal (the baseline), the supplier is better than competitors at creating relationships, and the supplier is worse than competitors at creating relationships

Following Postulate 1a, the deeper the relationship that customers form with a particular supplier, the more difficult it is to move customers from one competitor to another The baseline scenario reduces the probability of gaining one of the competitor's acquaintance customers versus gaining one of the friend customers from 25 to 125, and the probability of gaining one of the partner customers is reduced to 0625 This represents a 50% decrease in the switching probabilities for each relationship level We set the probabilities of losing one of the focal supplier's customers to a competitor in the same way and with the same values in the baseline model

In summary, the baseline simulation scenario uses the diffusion curve defined in Equation 5 as a base We applied the conversion and switching probabilities to this customer base to determine the number of acquaintances, friends, and partners for both the focal supplier s (Equations 1–3) and competitors as a whole in each of 100 time periods as the market evolves We then used these relationships as well as the cost and margin parameters to determine the contribution of each type of relationship in the supplier's portfolio over time as well as overall CPLV using Equation 4 The aggregated CPLV results for the simulations are shown in Table 2

Figure 2 shows the contributions by market period and relationship type for the baseline scenario Figure 2 illustrates how acquaintances, friends, and partners make their greatest contribution to overall CPLV at different points in time Although the baseline scenario suggests that acquaintances contribute the most to CPLV over time (friends and partners add value as the market matures), note that this is a direct function of the input used It is more important to focus on relative changes as we vary the parameters

In the following sections, we first examine how variation in economies of scale affects the development of the portfolio We then examine how differences in competitive capabilities reflected in probabilities of converting customers to closer relationships and gaining or losing customers at a given relationship level affect the portfolio over time Finally, we illustrate the dynamics of industry shocks on CPLV, especially as they relate to sudden changes in unit costs and relationship premiums

Economies of Scale

To determine the effect of differences in economies of scale, we developed scenarios that deviate from the baseline (both greater and lesser economies of scale) Scenario 2 illustrates a situation in which the economies of scale are lower than the baseline This is typical of many service firms and industries in which the more service that is added to the overall product offering, the more involved are the human resources of the firm and customers themselves, which lowers produc-

TABLE 2
Parameter Values, Relationship Contributions, and Overall CPLV for Different Scenarios

Scenario	Parameter Values Varied	Acquaintances' Dollar Contribution (Percentage of CPLV)	Friends' Dollar Contribution (Percentage of CPLV)	Partners' Dollar Contribution (Percentage of CPLV)	CPLV in Dollars (Percentage of CPLV)
1 Baseline scenario	Economies of scale = 50% industry maximum Probability of converting relationships = 25 for all relationships Probability of gaining relationships = 25 (acquaintances), 125 (friends), and 0625 (partners) Probability of losing relationships = 25 (acquaintances), 125 (friends), and 0625 (partners)	$271,604,881 (60 6%)	$128,384,427 (28 7%)	$ 48,000,757 (10 7%)	$ 447,990,064 (100%)
2 Decreased economies of scale	Economies of scale = 20% industry maximum Probability of converting relationships = 25 for all relationships Probability of gaining relationships = 25 (acquaintances), 125 (friends), and 0625 (partners) Probability of losing relationships = 25 (acquaintances), 125 (friends), and 0625 (partners)	$ 83,894,091 (38 4%)	$ 94,337,516 (43 2%)	$ 40,099,941 (18 4%)	$ 218,331,548 (100%)
3 Increased probability of relationship conversion	Economies of scale = 50% industry maximum Probability of converting relationships = 50 for all relationships Probability of gaining relationships = 25 (acquaintances), 125 (friends), and 0625 (partners) Probability of losing relationships = 25 (acquaintances), 125 (friends), and 0625 (partners)	$374,213,019 (34 5%)	$328,771,857 (30 4%)	$380,446,304 (35 1%)	$1,083,431,180 (100%)
4 Increased probability of converting acquaintances, decreased probability of converting partners	Economies of scale = 50% industry maximum Probability of converting relationships = 50 (acquaintances), 25 (friends), and 125 (partners) Probability of gaining relationships = 25 (acquaintances), 125 (friends), and 0625 (partners) Probability of losing relationships = 25 (acquaintances), 125 (friends), and 0625 (partners)	$556,162,600 (61 9%)	$289,965,158 (32 3%)	$ 51,992,103 (5 8%)	$ 898,119,861 (100%)
5 Increased probability of gaining customers from competitors	Economies of scale = 50% industry maximum Probability of converting relationships = 25 for all relationships Probability of gaining relationships = 50 (acquaintances), 25 (friends), and 125 (partners) Probability of losing relationships = 25 (acquaintances), 125 (friends), and 0625 (partners)	$505,739,692 (69 2%)	$170,023,053 (23 2%)	$ 55,387,093 (7 6%)	$ 731,149,838 (100%)
6 Cost shocks over time	Cost shocks of $33 33 introduced in periods 34 and 67 Other parameters same as baseline scenario	$ 62,931,022 (33 1%)	$ 88,863,027 (46 8%)	$ 38,172,167 (20 1%)	$ 189,966,216 (100%)

tivity (Huff, Fornell, and Anderson 1996) In this scenario, industrywide unit costs decrease asymptotically from $100 to $80 over the course of the product life cycle ($UC_{minimum}$ = $80, $UC_{decrease}$ = $20), which compares with the lower limit of $50 in the baseline scenario We operationalize an individual supplier's actual share of the cost savings as the percentage of industry unit cost savings based on the supplier's market share at time t For example, the target supplier's market share reaches 36% by Period 100 in the baseline scenario This translates into a unit cost of approximately $82 when the industry maximum is 50% (baseline scenario) and $93 when the industry maximum is 20% (Scenario 2)

The results for Scenario 2 are shown in Figure 3 A comparison of Figures 2 and 3 (and the results in Table 2) illustrates two important predictions of the typology and CPLV model First, as economies of scale decrease, the overall

FIGURE 2
Contributions over Time for Baseline Scenario
(Scenario 1)

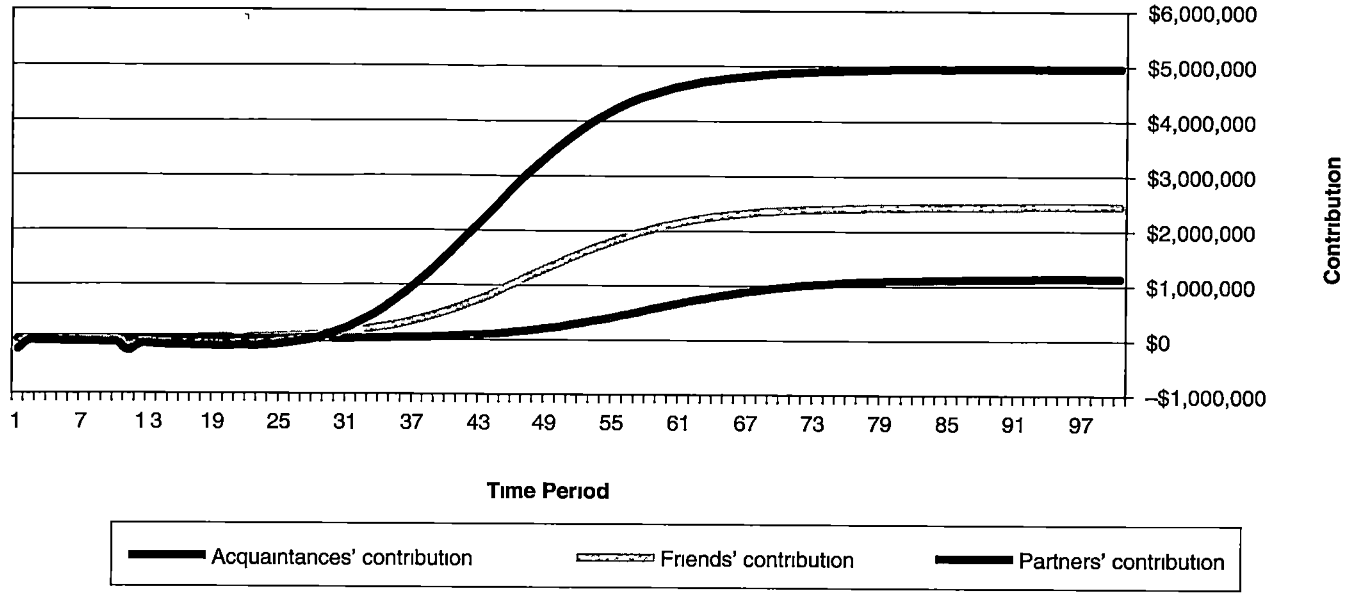
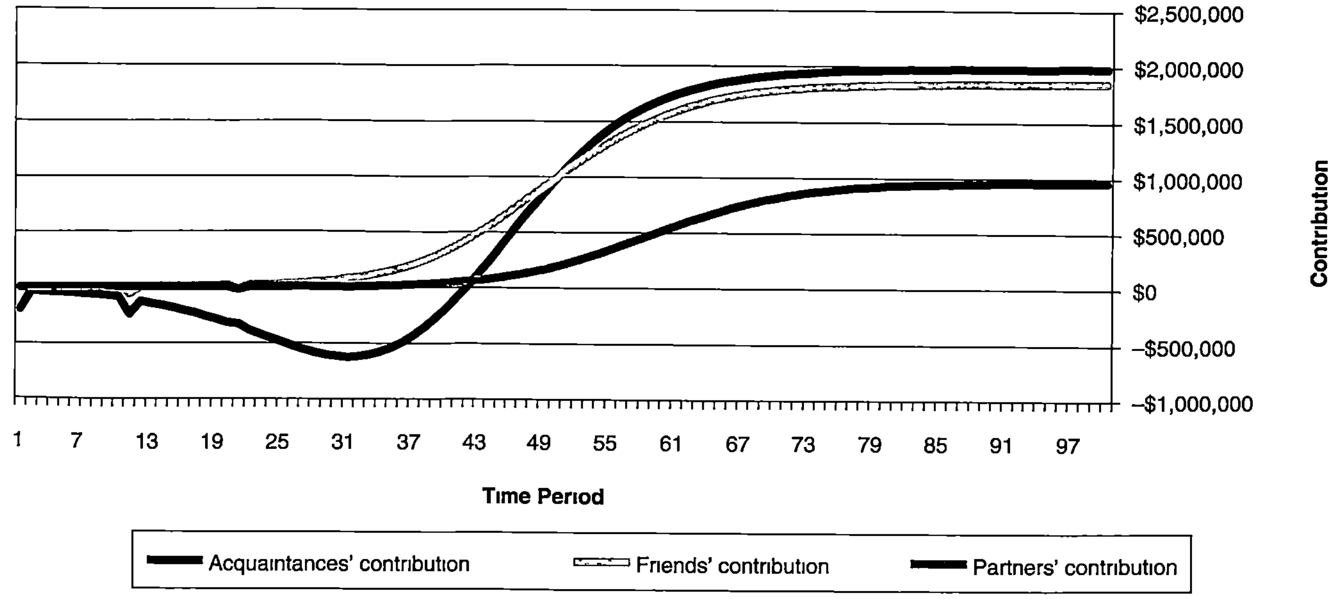


FIGURE 3
Contributions over Time When Economies of Scale Decrease
(Scenario 2)



value of CPLV decreases rather dramatically The CPLV drops from $448 million in the baseline scenario to just $218 million when economies of scale are small (see Table 2) Second, the relative contribution of acquaintances is much more susceptible to changes in economies of scale than are the contributions of friends and partners In Figure 3, acquaintances are no longer the most profitable relationship category early in a market's growth, acquaintances are a losing proposition over the early market periods because the scale advantages of growth have yet to compensate for the cost of creating the relationships The contribution of friendships toward overall CPLV increases from 29% in the baseline to 43% in Scenario 2, and the contribution of partnerships increases from 11% to 18% In contrast, the contribution of acquaintances falls from 61% in the baseline to 38% in Scenario 2 When economies of scale are even higher than in the baseline scenario (80% maximum unit cost decrease for the industry), the contribution of acquaintances increases relative to both friends and partners such that arm's-length relationships dominate the market over time The simulations illustrate the inherent challenge with acquaintances Because the margins on acquaintances are much lower than the margins on friends and partners, their contribution to CPLV is more susceptible to changes in economies of scale

The results help explain the basic shift in marketing thinking as economies have matured over the past 50 years The loss of economies of scale has resulted in a shift in strategy that once focused on market share and arm's-length relationships to a focus on closer relationships with customers Not only are friendships and partnerships more profitable as a market matures, but also their attractiveness increases in a customer portfolio when scale economies are limited

Competitive Capability in Converting Relationships

A firm's particular competitive capability to convert customers to closer relationships affects the attractiveness of different relationships in its portfolio We conducted various simulations of the CPLV model to understand these implications Scenario 3 illustrates a situation in which firms have the requisite skills to increase the probability of converting relationships to a level of 50 for each type of relationship, compared with a level of 25 in the baseline scenario That is, the absolute level of conversion probabilities increases compared with the baseline, but it remains constant across relationships Figure 4 shows the contribution over time by relationship type for Scenario 3 Note that there is a systematic transition over time where acquaintances and friends make the greatest contributions early in the market, but by Period 61, partners come to dominate the portfolio Moreover, the CPLV for Scenario 3 (see Table 2) grows to more than twice the value of the baseline CPLV ($1 083 billion versus $448 million) We formalize these findings in the following proposition

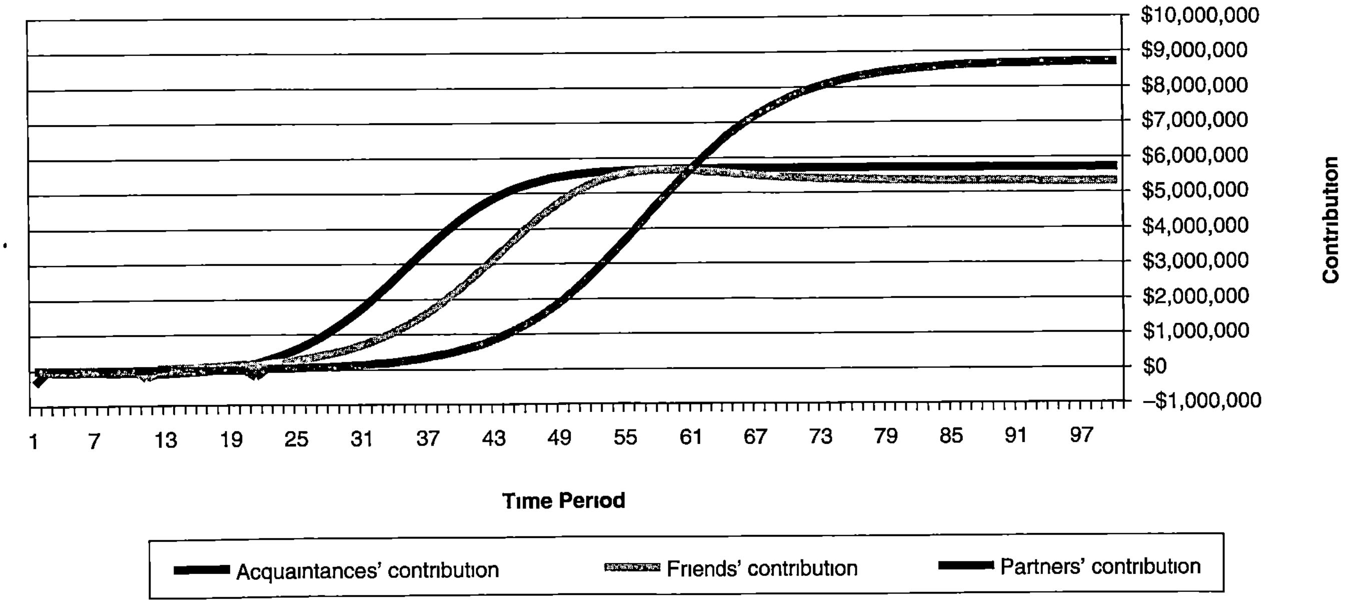
> P_1 As the competitive capability of converting customers to closer relationships increases relative to competition, (a) CPLV increases, and (b) closer relationships make a greater contribution to CPLV over a longer period of time

Put simply, P_1 captures how a firm that is superior at building closer relationships creates more value through those relationships over time

Competitive Capability in Creating Acquaintances

More notable are firm-level differences with respect to the ability to create a particular type of relationship To illustrate, Scenario 4 operationalizes a set of conversion proba-

FIGURE 4
Contributions over Time When Probability of Relationship Conversion Increases (Scenario 3)



bilities that vary by relationship level, in which it is easier for the supplier to create acquaintances ($p = 50$) than friends ($p = 25$) or partners ($p = 125$) in any given time period Again, the probability that competitors are able to create either friends or partners is held constant at 25 (the baseline level) Variation of the probabilities by relationship level offers important insights into the dynamics of a customer portfolio Differences in the contributions over time are not as revealing as the change in the ultimate value of acquaintances, friends, and partners, as reported in Table 2 For firms that are better at creating acquaintances than friends and partners, the CPLV equals $898 million, which is more than double the baseline CPLV of $448 million Although partnerships make up a larger proportion of CPLV in the baseline scenario, the contribution of each relationship type declines These findings lead to the following proposition

> P_2 As the capability of creating distant relationships increases relative to the capability of converting customers to closer relationships, (a) CPLV increases, and (b) distant relationships make a greater relative contribution to CPLV over a longer period of time

The important insight from P_2 is that a key to creating value through friendships and partnerships is a firm's ability to bring customers into the portfolio as acquaintances in the first place If a firm specializes in creating close relationships at the expense of being poor at converting strangers into acquaintances, profitability decreases dramatically Although closer relationships make greater relative contributions to the customer portfolio, there is a much smaller customer base to draw on, such that all relationship types are less profitable Put simply, it is better to generate a larger bucket of distant relationships than a smaller bucket of close relationships Without the larger, leakier bucket, the number of close relationships the supplier can form is inherently restricted

Competitive Capability of Gaining and Keeping Relationships

Our relationship typology suggests that the deeper the relationship customers form with a particular supplier, the more difficult it is to move customers from one competitor to another That is why probabilities of gaining and losing customers decrease from acquaintances, to friends, to partners in each scenario However, the level of the probabilities should again vary with a supplier's marketing capabilities In Scenario 5, we assume that the supplier is twice as likely to gain customers from competitors at a given relationship level (probabilities of gaining customers are 5, 25, and 125 for acquaintances, friends, and partners, respectively) as they are to lose customers to competitors (probabilities of losing customers are 25, 125, and 0625 for acquaintances, friends, and partners) This is a situation in which the supplier has relatively strong marketing capabilities of gaining versus losing customers

The results for Scenario 5 vary from the baseline scenario in two important ways First, the overall value of CPLV increases by 63% (from $448 million to $731 million) Second, and more important from a portfolio management standpoint, the relative contribution of acquaintances in the overall CPLV increases from 61% to 69% of the portfolio The relative contributions of friendships and partnerships decrease from 29% and 11%, respectively, in the baseline scenario to 23% and 8% in Scenario 5 These findings provide the basis for the following proposition

> P_3 As the competitive capability of gaining and keeping customers increases, (a) CPLV increases, and (b) distant relationships make a greater contribution to CPLV than do closer relationships over time

Particularly notable is the flip side of P_3 If a supplier is relatively poor at retaining customers, it must rely more on friendships and partnerships to survive The weaker a firm's relative switching probabilities, the more it benefits from closer relationships Such a firm is simply less likely to lose customers that manage to become friends and partners This result is consistent with research by Ghosh and John (2002), who find that firms operating from a position of strength are less likely to create close alliances with suppliers This result is also consistent with the research of Rust, Moorman, and Dickson (2002), who examine whether it is more profitable for firms to pursue a strategy of quality improvements to enhance customer satisfaction, which subsequently will attract and keep customers, or to pursue a strategy of quality improvements to enhance cost efficiency to improve margins On the basis of a sample of established companies, they find that firms that emphasize building a larger customer base perform best

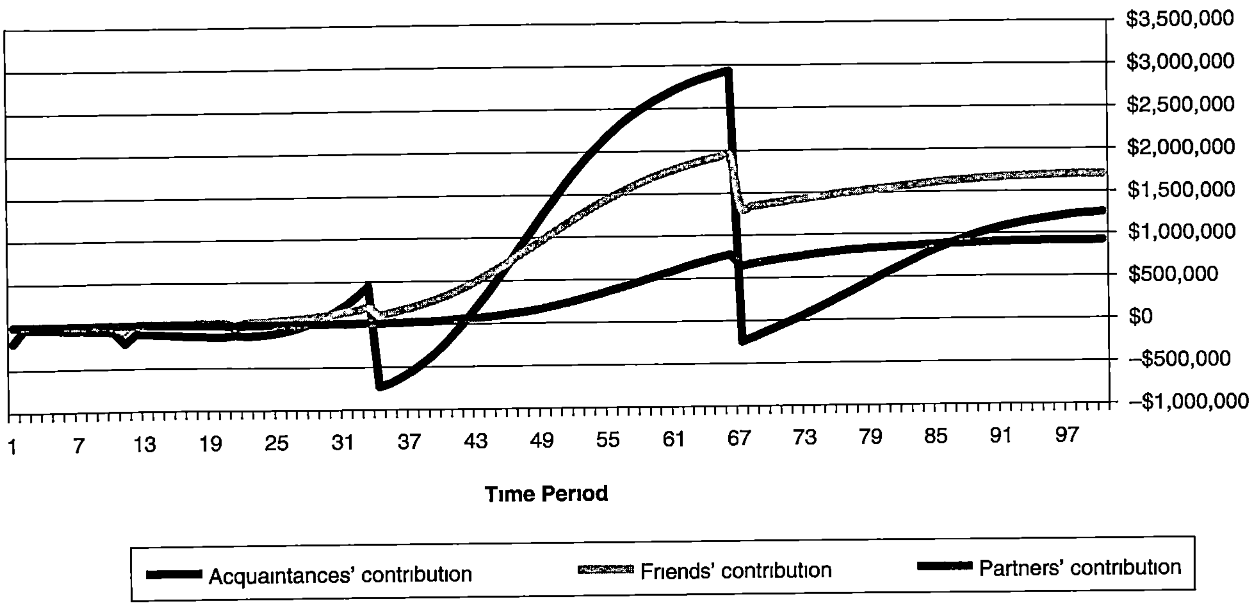
Shocks in the System

Finally, we use the CPLV model to examine the effects of shocks in the system on the value of different relationships in a portfolio We explored two types of shocks that directly affect contributions sudden changes in unit costs and sudden changes in revenue premiums Periodically, companies incur costs associated with, for example, point-in-time investments in technology upgrades, expansion of a physical plant, or the purchase of new equipment To illustrate this situation, Scenario 6 illustrates the baseline scenario while adding unit costs that amount to one-third of the Period 0 unit cost base of $100 (i e , $33 33) in Period 34 and again in Period 67 For simplicity, we reduced the additional unit costs over time at the same rate as the original unit costs

The results are reported in Table 2 and Figure 5, which illustrates how the cost shocks result in greater swings in the contribution of acquaintances in relation to friends and partners Even though the contributions from acquaintances remain high, the contribution risks are also high Partners and friends show less fluctuation in their contributions over time Because the margins are relatively thin for acquaintance customers, the sudden increases in costs have more dramatic effects on their contributions Another notable result from Scenario 6 is that the relative contribution of friends and partners increases to a point at which friends provide the greatest overall contribution because they effectively balance contribution risk and return

We also explored shocks or sudden reductions in the revenue premiums, as might occur when economic conditions are particularly weak (customers spend less and are more price sensitive) As we expected, the revenue premium

FIGURE 5
Contributions over Time When Cost Shocks Occur
(Scenario 6)



shocks reduce the relative contribution of partners and friends and make the contributions less predictable These results provide the basis for the following proposition

> P_4 When a market is subject to sudden increases in unit costs (reduced revenue premiums), (a) closer (distant) relationships make a greater contribution to CPLV than do distant (closer) relationships, and (b) closer relationships have less (more) variance or risk associated with their contributions than do distant relationships

In our discussion, we explore the firm-level implications of this risk–return trade-off

Sensitivity Analyses

Recall that we simulated the CPLV model over various parameter values that we have not reported We summarize these results here to evaluate the sensitivity of our propositions to wider variation in the parameters Reducing the relationship premiums from closer relationships to relatively low values (an additional $5 for friends and $10 for partners versus $25 and $50 for the baseline scenario) or increasing the premiums to double the baseline scenario ($50 for friends and $100 for partners) only affects the magnitude of the differences across relationships and does not change the relative predictions In general, as the relationship premiums from closer relationships increase, the positive contributions from the relationships increase and occur earlier in a market's growth Similar results occur when (1) the probability of converting customers to closer relationships continues to increase relative to competitors and (2) the probability of converting friends to partners increases relative to the probability of converting stranger to acquaintances The various simulations show that P_1–P_4 are not sensitive to alternative starting values in the baseline scenario

We also simulated what happens when the base revenue per customer for supplier s at time t (CR_{st} in Equation 4) gradually erodes over time, as often occurs when competition reduces base margins Similar to our findings for cost shocks, acquaintances are much more sensitive to these changes because their margins are lower One scenario decreased base customer revenues by $ 25 each period The contribution of friends dominated the scenario (CPLV of $128 million) and partners were profitable (CPLV of $48 million), but acquaintances became rather unprofitable (CPLV of –$40 million), though the acquaintances provided the base from which the more profitable friends and partners evolved

Discussion

Marketing has evolved over time from an emphasis on market share and size to an emphasis on developing relationships with customers as the key to profitability An understanding of this evolution and of what drives profitability over time requires a dynamic theory of exchange relationships that encompasses the trade-offs between the two sources of profitability Scale economies of growth emphasize the need to move customers "in the system" to lower costs In contrast, CLV emphasizes the need to build relationships and to keep customers over time to capture the "back loading" of customer revenues We have contributed to this theory by developing a typology of exchange relationship mechanisms that capture fundamentally different forms of value creation Our typology suggests that marketers take a more comprehensive view of offensive and defensive marketing strategies than currently exists The purpose of offensive marketing is not only to increase a market but also to provide a basis for customer portfolio development. The purpose of defensive marketing is not simply to prevent customer defections but also to create value through relationship development.

The overall value of a firm's customer portfolio is an aggregation of the contribution from individual exchange relationships over time. At a basic level, suppliers create acquaintances by providing parity value, friends by providing differential value, and partners by providing customized value. Prevailing theories and strategies in marketing argue for building friendships (e.g., brand relationships) and partnerships. Brand building has been the primary means of building a purchase–consumption–repurchase relationship with suppliers (Aaker 1996). Theories of customer behavior have similarly focused on brand concepts (Howard 1977, 1983) and loyalty, defined as repeat purchase and related behaviors (e.g., repurchase intentions, word of mouth, price sensitivity) (Bloemer, Ruyter, and Wetzels 1998). Partnering is usually connected to business-to-business marketing, in which commitment-based resource sharing is widely recommended (Moorman, Zaltman, and Deshpandé 1992; Morgan and Hunt 1995). The theoretical framework presented here should open the eyes of the marketing community to focus more on accumulated value creation of a customer portfolio, not on the value created in single relationships. Although in some situations the accumulated value created in a customer portfolio may be dominated by friends and partners, acquaintances are more likely to be the cornerstone of a firm's portfolio and the primary source of economies of scale. Thus, managers should not necessarily stop doing business with customers that are less profitable on an individual basis.

We illustrated the complexity of how value is created in a portfolio of relationships in several scenarios. One of the more interesting scenarios shows that a leaky bucket of customers may create more value than a tight bucket. If a firm specializes in creating close relationships at the expense of acquiring acquaintances, profitability decreases dramatically. The important implication is that the key to creating value through closer relationships is rooted in a firm's ability to bring weaker relationships into a portfolio in the first place. Another noteworthy and important insight is how sensitive portfolio value is to variations in economies of scale. If economies of scale are low, as they are for many types of services, closer relationships tend to generate more value than distant relationships. Thus, the more a firm is positioned toward product offerings with low economies of scale (i.e., high personal-service component), the stronger it must be in developing and keeping closer relationships.

Another scenario illustrates the risk–return trade-offs due to unexpected market changes. When the uncertainty is related to cost increases, closer relationships are better buffers toward unwanted variance in contributions. The implication is that intermediate-level relationships (i.e., the friends in our typology) provide a balance of risk and return. Friendships created through the development of strong brands should be particularly attractive when firms face considerable economies of scale (where distant relationships are relatively more profitable) but costs are uncertain (where closer relationships lower contribution risk). When uncertainty is related to relationship premiums, as when consumer spending varies over time, more distant relationships are better buffers against contribution variance.

A natural next step is to begin empirical investigations of our underlying postulates and resulting propositions. There is also a need to explore various dynamic factors that are certain to affect CPLV. These include demand shocks due, for example, to changes in technology or major events in society. In the current model, we have assumed a rather simplistic construction of the market in terms of segments (customers are only differentiated as acquaintances, friends, and partners). The validity of our theory and model will continue to improve as we model other types of segments in combination with the typology presented here. An example is segments based on purchasing volume (i.e., light versus heavy users). For example, what are the implications if the heavy users in the market are partners or acquaintances? Another segment-related issue is whether there are customers in the market that do not move through the progression from acquaintances, to friends, and to partners, but may begin directly as a friend or a partner customer. An implication of this is that the importance of acquaintances observed in the presented scenarios would be less. Thus, we require a deeper understanding of how different types of segments affect the value of the customer portfolio over time. We need to explore firm-level dynamics and their influence on customer portfolios as well. If first movers focus more on building acquaintances, should subsequent entrants invest more exclusively in the brands required to build friendships or in the firm-level capabilities required to build partnerships? Another issue is the effect of improvements in marketing capabilities over time. If a firm can improve either its acquisition skill or its relationship development skill, which would have the greatest impact in different circumstances?

Our intent has been to introduce a conceptual framework for how companies can better manage their customer portfolios. A natural question, then, is, How can we relate this conceptualization to a practical or applied level? A natural starting point for a company is its current portfolio of customers and, if available, its customer relationship management databases. A premise of our CPLV model is that customers should be classified according to how relationship value is created both for the customer and for the company. Thus, a challenge would be to develop measurement instruments or classification schemes that sort customers according to their value creation (e.g., relationship premiums, conversion probabilities, switching probabilities). Instruments are also needed to assess relative firm capabilities and the costs of customer acquisition and development. Finally, methods are required to analyze the dynamics of exchange relationships in a firm's portfolio as markets evolve that capture the interplay among customers, competitors, technology, and other factors. Moving the conceptual framework to an empirical and applied level is a challenge and an opportunity for both academics and practicing managers.

We provide a foundation for answering the questions raised by viewing a firm's customer base as a portfolio of exchange relationships that create value in fundamentally different ways over time. Our framework, relationship typology, postulates, and propositions provide scholars working in marketing and customer relationship management with a more dynamic approach to building a sustainable competitive advantage A firm's portfolio contains a combination of acquaintances, friends, and partners that is constantly changing This requires decisions as to when to invest in relationships based on their attractiveness over time Our approach provides a starting point for thinking about the conditions in which different relationship types should be the focus of a firm's customer portfolio

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Ad de Jong, Ko de Ruyter, & Jos Lemmink

Antecedents and Consequences of the Service Climate in Boundary-Spanning Self-Managing Service Teams

In this article, the authors examine antecedents and consequences of the service climate in boundary-spanning self-managing teams (SMTs) that deliver financial services Using data from members of 61 SMTs and their customers, the authors show a differential impact of the SMT service climate on various marketing performance measures Furthermore, they obtain support for independent group-level effects of intrateam support and team member flexibility on employee perceptions of the SMT service climate Both effects are persistent over time and demonstrate that collective perceptions in the SMT have incremental value in the explanation of the service climate

Research on boundary-spanning service employees has shown that delegation of authority to the front line allows for greater flexibility and adaptability in the performance of service activities through better problem solving, closer employee cooperation, and more efficient knowledge transfer (Hartline and Ferrell 1996) In apparent recognition of this, some companies have organized their front-office operations around self-managing teams (SMTs), or groups of interdependent employees that have the collective authority and responsibility to manage and perform relatively whole tasks Team members are typically cross-trained in various skills, including developing work routines, planning, and monitoring team performance (Yeatts and Hyten 1998) Companies such as Charles Schwab, Taco Bell, Prudential, Pacific Bell (now part of SBC Communications), CIGNA, Welch Foods, and Xerox have implemented boundary-spanning SMTs (Batt 1999, Cameron and Boise 1995, Wageman 1997)

It has been argued that self-management is an excellent mechanism for improving the performance of the employee–customer interface (Gilson, Shalley, and Blum 2001) However, this claim is not substantiated by the empirical evidence Whereas Batt (1999) shows that front-office service SMTs perform significantly better in terms of service quality and sales volume than do teams under management control, Chaston (1998) reports an adverse impact on service quality and productivity Whereas Wageman (1997, p 32) states that the performance of field-service SMTs at Xerox is "critical to the company's ultimate success," other reports from the business press contest the validity of this assumption (e g , Zemke 1993) Empirical inconsistencies, conflicting anecdotes, and a lack of theoretical development regarding SMTs in service settings emphasize the need for research that addresses four important theoretical and empirical issues that have been unresolved in previous studies

First, the research to date has virtually ignored the development of a mediating construct to account convincingly for the apparent inconsistencies in SMT performance At the firm level, Schneider, White, and Paul (1998) demonstrate that a service climate is a key mediating factor in the prediction of marketing performance Accordingly, we advance a construct of the SMT service climate that is proximal to perceptions of work-group practices to explain performance variability among teams

Second, previous research on customer-contact SMTs has focused predominantly on processes within the team (e g , Cohen, Chang, and Ledford 1997) However, as Hackman (1992) argues, teams do not operate in isolation Therefore, climate perceptions may also be the result of organizational context characteristics We develop a conceptual framework that takes into account both team- and company-related predictors of the SMT service climate

A third issue that has not been explored is whether climate-defining team characteristics have an impact at the work-group level that is beyond the perception of individual employees Each SMT may develop a unique set of shared perceptions of desirable behavior (e g , the level of support to other team members), and between-group differences may be contingent on these perceptions (Mathieu and Kohler 1990) Therefore, we examine whether group-level aggregations of team member perceptions incrementally determine employee perceptions of the SMT service cli-

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mate The group-level effects may be contingent on the type of service delivery Stewart and Barrick (2000) demonstrate that task type moderates variability in the magnitude of reported predictor–criterion relationships in explaining manufacturing SMT performance We extend this finding by considering distinct types of service delivery in our analysis of group-level antecedents and consequences of the SMT service climate

Fourth, the impact of boundary-spanning teams on business performance measures (Batt 2002) is unknown Part of the gap in the knowledge about SMT effectiveness stems from the complexity in considering various types of performance measures (e g , customer evaluations versus productivity measures) across different types of service delivery (Batt 2002) Another reason is that extant studies may not have been able to provide definitive conclusions on frontline SMT effectiveness because they employed cross-sectional data on relationships that might have needed to be separated in time (Griffin 1991) Therefore, we examine the lagged effects of the SMT service climate on customer perceived quality, share of customer, and sales productivity for two types of service delivery

The increasing importance and ubiquity of boundary-spanning SMTs, despite inconsistent and sometimes contradictory findings, create the need for more definitive research that describes and defines the nature and scope of SMTs and their possible effects We propose four additions to SMT research and test the theoretical and empirical advantages and implications of these additions

Development of a Conceptual Framework

SMT Service Climate

Although various employee-based measures (e g , job satisfaction) have been advanced as drivers of service performance, it also has been argued that service climate has superior predictive power (Schneider, Wheeler, and Cox 1992) We extend previous research by adopting a team-level focus on service climate Our conceptual point of departure for developing several definitional assumptions is Katz and Kahn's (1978) description of climate being the result of a distinct pattern of individual team members' collective beliefs developed through members' interaction with their social environments First, this description theoretically relates climate to antecedent variables in the organizational and team contexts (Lindell and Brandt 2000) Second, Katz and Kahn (1978) posit that perceptions of climate are essentially a property of the individual member that can be aggregated to reflect a group-level construct (see James and James 1989) Third, as climate is related to various environments, different climates may exist for organizational goals and structural levels Proximal measures that conceptualize climate in terms of both goals (e g , customer service) and levels (e g , the team) produce strong relationships with targeted performance parameters (Tesluk et al 1995) Finally, because climate involves the construction of shared meaning through the process of interaction, the process is dynamic and in line with Hackman's (1987) process criterion of effectiveness, which relates to team members' effort, knowledge, skill, and performance in achieving team goals Thus, we define *SMT service climate* as the collective beliefs of SMT members on effort, knowledge, skills, and performance with regard to effective service delivery

Antecedents of SMT Service Climate: An Individual-Level Perspective

Our framework, which relates SMT service climate to its antecedents, has two distinct conceptual roots (1) Hackman's (1987) normative model of team effectiveness, which distinguishes intra- and extrateam factors, and (2) the involvement approach (Bowen and Lawler 1992), according to which employees are given the authority and resources to coordinate, plan, and control the service delivery process Three main characteristics that differentiate service SMTs from other traditional work groups govern our choice of predictor variables (1) higher levels of autonomy, (2) functional flexibility, and (3) interdependency within and between teams (Campion, Medsker, and Higgs 1993) In general, SMTs are designed with a certain degree of role-related diversity (Yeatts and Hyten 1998) Researchers have posited that perceptions of collective phenomena (i e , service climate) represent cognitive interpretations of proximal structures and processes based on a person's experience, values, knowledge, and expertise (Brown and Leigh 1996) Thus, members of the same SMT may have different perceptions of the SMT service climate defining antecedents Prior research on work groups has demonstrated that within-group perceptual deviation reflects systematic (not random) variance that may represent differential cognitive appraisals of the team environment (Van Yperen and Snijders 2000) Thus, we postulate predictor–criterion relationships at the individual level

Hackman (1987) posits that a supportive organizational context is a major determinant of group effectiveness A central component of the involvement approach is empowerment, which refers to the notion that service employees must be given a certain degree of autonomy and be able to perform job-related activities with skill (Hartline and Ferrell 1996) Recent research on production teams demonstrates that senior management's lack of tolerance for self-management may be an important barrier to SMT effectiveness (Balkema and Molleman 1999) Furthermore, in the case of boundary-spanning SMTs, it has been consistently argued that perceived autonomy is critical to the attitude and behavior of customer-contact personnel (Batt 1999, Van Mierlo et al 2001, Wageman 1995) Thus

H_1 Tolerance for self-management positively affects employees' perceptions of the SMT service climate

In addition, SMT members need to be able to use delegated authority optimally, this ability has been associated with several synergistic processes in teams (Hackman 1987) The SMT members should be capable of performing various team tasks, whether operational, managerial, or administrative (Spreitzer, Cohen, and Ledford 1999) As the spectrum of SMTs' tasks grows, job assignments rapidly evolve, SMTs need to become highly interdependent, and there is a need for flexible and multiskilled members (Batt

1999, Sundstrom, de Meuse, and Futrell 1990) Recent research (Marks, Mathieu, and Zaccaro 2001, Mathieu et al 2000) has demonstrated that the ability to perform interrole behaviors facilitates attainment of team goals We hypothesize that perceptions of team member flexibility form another relevant foundation for the establishment of service climate

> H_2 Flexibility of team members positively affects employees' perceptions of the SMT service climate

The literature on employee involvement has demonstrated that coworker involvement reduces perceptions of boundary-spanner role stress and increases service performance (Bettencourt and Brown 1997) The implication is that when service employees experience peer-based learning and coworkers' service-driven attitude, they will be motivated to carry over this attitude to their customer encounters Frequently, cooperative interaction within and between SMTs is required to address customer service requests successfully and to create a service-oriented work environment (Horwitz and Neville 1996) The services marketing literature posits that mutual support among employees is essential to the implementation of service-quality improvements (Berry, Parasuraman, and Zeithaml 1994) Batt (1999) has shown that collaborative endeavors are a key success factor of SMT effectiveness in boundary positions Conceptually, we distinguish between inter- and intrateam support Interteam support refers to team member perceptions of the internal service and communication between teams and other units in the organization, whereas intrateam support pertains to team members' willingness to offer help and to deliver service to other members of the group in order to attain work-group goals (Campion, Medsker, and Higgs 1993) We hypothesize the following

> H_3 Employee perceptions of the SMT service climate are positively affected by (a) interteam support and (b) intrateam support

Although some researchers claim that the individual perspective constitutes the only proper unit of analysis, others argue that the study of group phenomena can be analyzed in a meaningful way only at the group level (Lindell and Brandt 2000) Therefore, in the next section, we discuss the conceptualization of the aforementioned predictor variables at the group level

Antecedents of SMT Service Climate: A Group-Level Perspective

It has been advanced that by evoking the notion of climate, each team can develop a unique set of norms and mental models regarding desirable behavior (e g , the level of support to other team members), thus reflecting between-group differences (Mathieu and Kohler 1990) Studies on shared mental models (Mathieu et al 2000) and transactive memory in teams (Liang, Moreland, and Argote 1995) demonstrate that team members develop shared beliefs about their team that instigate team members to develop interrelated knowledge and norm structures to facilitate group processes Lindell and Brandt (2000, p 332) state that shared beliefs reflect that individual members "are socialized to act in similar ways, are exposed to similar features within contexts, and come to share their interpretations with others in the setting" Beliefs are conceptually distinct from constructs that exist at the group level only (e g , team size) (Gully et al 2002) Aggregate-level constructs reflect psychosocial traits that are not captured by the individual-level measurement (Hackman 1992) These constructs may differentially influence individual members' perceptions of the SMT service climate Group-level constructs strongly reflect the basic assumption of synergistic processes within the SMT (Hackman 1987) Poole and McPhee (1983, p 213) view sources of work-unit climate as collective attitudes that are "continually produced and reproduced by members' interactions" Particularly in service SMTs, there is a relatively high level of interdependence and interactions (Batt 1999), in which shared perceptions, unique to the work unit, are formed

To better understand the similarities and differences inherent in multiple-level constructs, scholars have used the typology of elemental composition (Bliese 2000, Chan 1998) Elemental composition takes place when a higher-level construct consists of collective lower-level measures The composition model for the SMT antecedents in our study is the direct consensus model, which characterizes climate-defining antecedents as properties of the individual team member At the same time, when there is consensus between individual perceptions (e g , on intrateam support), the aggregate composes a construct at the work-group level that represents shared perceptions of a collective belief Prior research on teams' withdrawal behavior (absenteeism and lateness) in boundary-spanning service settings provides evidence of the influence of group-level predictors on individual employee behavior beyond individual-level antecedents Mathieu and Kohler (1990) and Blau (1995) report significant effects of aggregated group-level variables on individual employee behavior in auto repair, hospital, and banking service teams Their results seem to support Bryk and Raudenbush's (1992) contention that group-level aggregations of contextual properties represent a distinct perspective that may not be captured by individual-level measures Therefore, we hypothesize the following

> H_4 At the group level of analysis, the positive effects of (a) tolerance for self-management, (b) team member flexibility, (c) mterteam support, and (d) intrateam support account for a significant amount of additional variance in individual employees' perceptions of the SMT service climate

Antecedent–SMT Service Climate Relationships Across Service Types

Positive linear relationships between SMT characteristics and member-related outcomes (e g , employee satisfaction, organizational commitment) within and across various frontline service settings have not yielded a consistent pattern (Batt 1999, Cohen, Chang, and Ledford 1997, Gilson, Shalley, and Blum 2001, Wageman 1997) Variability in the magnitude of reported predictor–criterion relationships may indicate the presence of moderator variables, such as task characteristics In a manufacturing setting, Stewart and Barrick (2000) show that SMTs that are responsible for routine tasks are less likely to be affected by flexibility and interdependency than are SMTs that perform nonroutine activities

Recent research by Marks and colleagues (2002) demonstrates that the development of shared beliefs regarding team processes fosters coordinated task behavior and the ability to adapt dynamically in uncertain environments Particularly in the case of nonroutine tasks, norm congruence and shared understanding on how to function as an SMT affect climate perceptions Because services have also been classified in terms of a routine–nonroutine continuum (Davis 1999), we expect service type to moderate the impact of group-level predictor variables We posit the following

H_5 Service type moderates the positive effects of (a) tolerance for self-management, (b) team member flexibility, (c) interteam support, and (d) intrateam support on employees' perceptions of the SMT service climate, such that effects are significantly stronger at the group level for nonroutine services than for routine ones

Consequences of SMT Service Climate

There is ample evidence that employee perceptions of service climate at the firm level have a positive influence on customer perceptions of service quality (Schneider et al 1996, Schneider and Bowen 1985, Schneider, White, and Paul 1998) In addition to psychological outcome parameters, it has been argued that the behavioral outcome "share of customer," or the number of services purchased from a specific service provider, is a key marketing-performance indicator (Babin and Attaway 2000) The overall premise is that the impact of policies and practices aimed to serve the customer should also be observable in customer behavior, because both perceived service quality and purchase behavior are closely related and should be evaluated simultaneously when pursuing profitability (Soteriou and Zenios 1999) Service firms may also focus on productivity as a performance parameter, specifically on quantifiable behavioral standards of employee behavior, such as volume of services sold (Singh 2000) However, recent evidence suggests that, especially in the area of services, firms should make trade-offs between establishing a focus on delivering quality services and sales ratios per employee (Anderson, Fornell, and Rust 1997, Singh 2000) Thus, we expect that a strong SMT service climate with an emphasis on providing high-standard services will result in decreased productivity It has been suggested in both the service marketing and the team literature that inconsistencies in performance assessment are contingent on the time frame used in the analysis (Griffin 1991) Empirical evidence from the services marketing literature shows that customers' assessments of service quality are relatively constant and subject to slow change (Bolton and Drew 1991) Moreover, Bernhardt, Donthu, and Kennett (2000) argue that the true impact of service changes in terms of observable customer behavior (e g , actual services purchased) can be assessed only longitudinally Finally, Griffin (1991) reports a delay between the implementation of frontline service SMTs and performance improvements Therefore, we propose the following

H_6 At the group level of analysis, SMT service climate at T1 positively affects (a) customer perceived service quality at T2 and (b) share of customer at T2

H_7 At the group level of analysis, SMT service climate at T1 negatively affects sales productivity at T2

Assessment of Consequences Across Service Types

Finally, we posit that the impact of SMT service climate on the aforementioned parameters may depend on the type of service Nonroutine service delivery frequently involves dealing with complex problems and equivocal situations that may benefit from an extended dialogue within the team and between team members and customers We expect that a climate that fosters service excellence is more influential in such circumstances

H_8 At the group level of analysis, service type moderates the positive effects of SMT service climate at T1 (a) on customer perceived service quality at T2 and (b) on share of customer at T2 and moderates (c) the negative effect on sales productivity at T2, such that effects are significantly stronger at the group level for nonroutine services than for routine ones

Figure 1 reflects our conceptual framework and provides an overview of the issues discussed thus far

Empirical Study

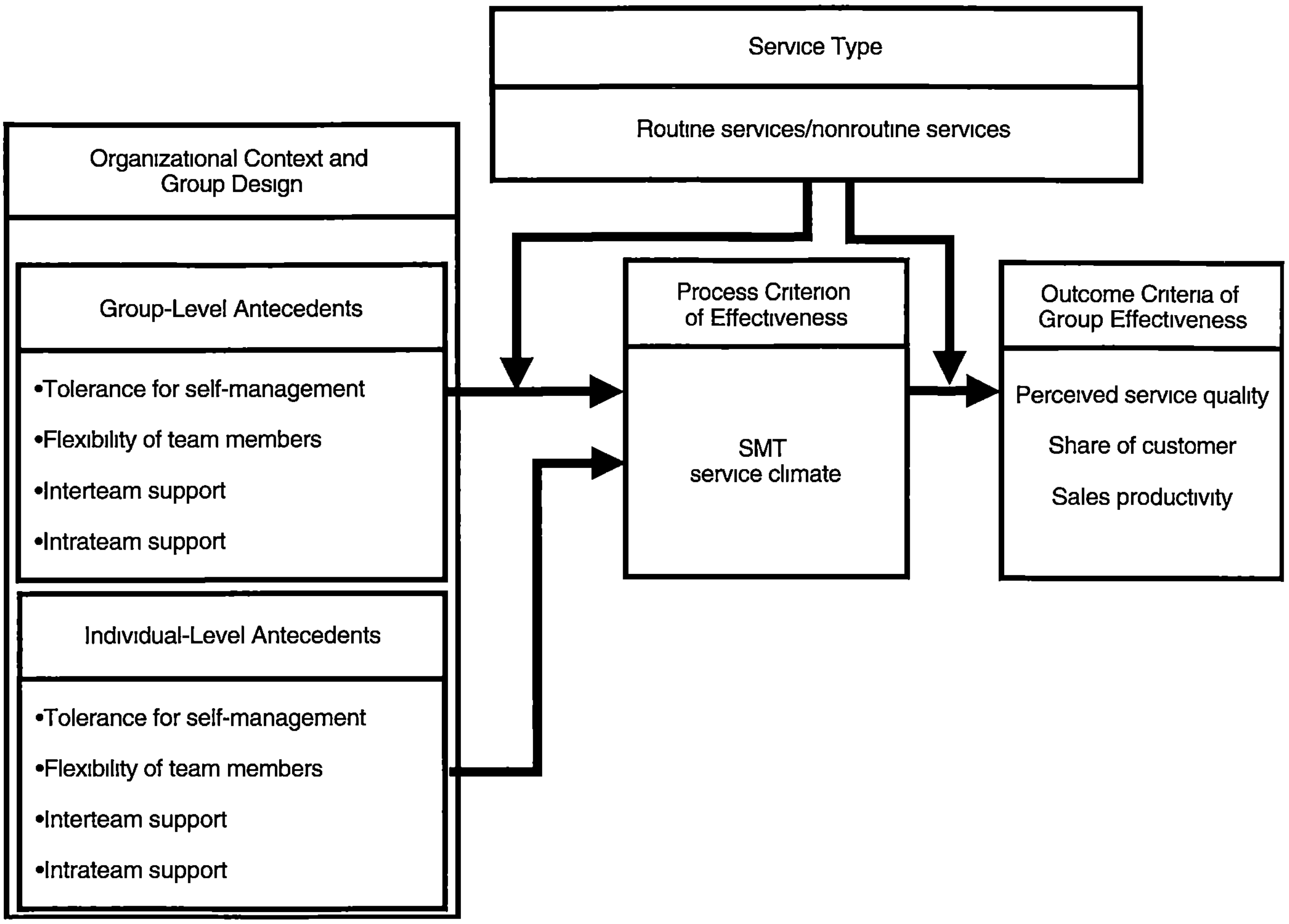
Research Setting

Members of a large Dutch bank's SMTs and customers were surveyed The bank employs approximately 48,000 people and has 424 branch offices It operates in both business and consumer markets and promotes service excellence as a key to marketing success In each branch, separate routine and nonroutine SMTs are responsible for servicing consumers, and other SMTs deal with business customers or are responsible for internal operations (e g , human resources management, general and technical services) In our study, we focused on SMTs that deliver consumer services Each branch offers a wide range of services to consumers nonroutine, knowledge-intensive services (e g , investment consulting, trust services, estate planning) and routine, transaction-intensive services (e g , checks and deposits, currency exchanges, credit application accounts) At each branch, separate front-office SMTs are responsible for the different service types (e g , financial versus client advisory teams) The bank considered implementation of team-based self-management an important organizational change process Therefore, the practical rationale for conducting our study at the initiation phase (T1) and seven months later (T2) was to evaluate the central role of SMT service climate and examine its impact on service performance

Sampling and Surveying

Of 848 boundary-spanning SMTs, we randomly selected a sample of 100 Unwillingness to cooperate and the lack of sales productivity and customer data resulted in a total set of 61 SMTs We collected data from individual employees organized in SMTs using self-report questionnaires (at T1 and at T2) and from their customers (at T2) using mail questionnaires For the employee survey, we invited all members of the SMT to participate In total, 939 questionnaires were returned at T1 (76 4%) and 730 questionnaires at T2 (62 1%) For the customer survey, we drew a random sample of 150 customers per SMT at T2 In total, 1884 ques-

FIGURE 1
Conceptual Framework


Service Type
Routine services/nonroutine services
Organizational Context and Group Design
Group-Level Antecedents
•Tolerance for self-management
•Flexibility of team members
•Interteam support
•Intrateam support
Individual-Level Antecedents
•Tolerance for self-management
•Flexibility of team members
•Interteam support
•Intrateam support
Process Criterion of Effectiveness
SMT service climate
Outcome Criteria of Group Effectiveness
Perceived service quality
Share of customer
Sales productivity

tionnaires were returned (20.8%). For the employee survey, we used 568 questionnaires from 36 nonroutine service teams (316 from 36 teams at T1 and 252 from 33 teams at T2) and 917 questionnaires from 25 routine service teams (509 from 25 teams at T1 and 408 from 23 teams at T2) for further analysis. For the customer survey, we analyzed 957 questionnaires of customers of 36 nonroutine service teams and 577 questionnaires of 25 routine service teams. With respect to the customer survey, we acquired the following sample profile. Most respondents were male (63.8%) and older than 44 years of age (58.5%). Virtually all respondents had a long-lasting relationship with the bank (93.1% more than five years) and half of them visited the bank at least once a month (49.8%). Detailed background data on participants at T1 as well as functional areas and responsibilities of the SMTs are included in Table 1.

Measurement Issues

The assessment of the SMT service climate involved items we specifically developed for this study, in-depth interviews with frontline employees, and scales developed by Schneider, Wheeler, and Cox (1992) and Peccei and Rosenthal (1997). We based the operationalization of tolerance for self-management (seven items) largely on the tolerance-of-freedom instrument of the Leader Behavior Description Questionnaire, which assesses the degree of autonomy given to employees to manage their task responsibilities themselves (Cook et al. 1981). We measured team member flexibility and inter- and intrateam support with scales developed by Campion, Medsker, and Higgs (1993). We measured all scale items for the employee survey on a seven-point scale that ranged from 1 = "strongly disagree" to 7 = "strongly agree." A qualified translator translated items into Dutch using the double back-translation procedure (Brislin 1980).

We employed two techniques to test the factor structure and the item loadings of the data collected at T1. We initially examined coefficient alphas and the factor structure (using principal components analysis) for all the scale items simultaneously. We achieved a five-factor structure in which items loaded on a priori dimensions. In addition, we conducted a confirmatory factor analysis (CFA) using LISREL to assess the measurement properties of the items. The fit indexes of the proposed factor model, construct reliabilities of the scales, and confirmatory factor loadings with t-values for each item are reported in Table 2. The indexes of the pro-

TABLE 1
Descriptors of SMTs at T1

	Employees of SMTs in Nonroutine Services (N = 316)		Employees of SMTs in Routine Services (N = 509)	
	Frequency	Percentage	Frequency	Percentage
Sex				
Male	187	59 2	86	16 9
Female	129	40 8	423	83 1
Age (Years)				
Younger than 40	149	47 2	303	59 5
Older than 40	167	52 8	206	40 5
Education Level				
Secondary	59	18 7	131	25 7
Tertiary	257	81 3	378	74 3
Organizational Tenure (Years)				
Less than 5	123	38 9	242	47 5
More than 5	193	61 1	267	52 5
Team Experience (Years)				
Less than 2	146	46 2	166	32 6
More than 2	170	53 8	343	67 4
Job				
Full time	217	68 7	217	42 6
Part time	99	31 3	292	57 4

	SMT Characteristics	
	Nonroutine Services	Routine Services
Team size (mean [s d])	13 98 (5 85)	36 76 (12 70)
Functional areas	General financial advisers Mortgage advisers Portfolio advisers Financial planners Insurance advisers Clerical staff Risk analysts	Client services employees Cashiers Receptionists Travel services Clerical staff Customer services (customer complaint management)
Responsibilities	Division and allocation of work Planning and budgeting Recruitment and training Developing new work routines Monitoring member and team performance Service recovery Internal and external coordination	

Notes In essence, the responsibilities of the SMTs do not differ between routine and nonroutine services

posed factor model provide a good fit and show unidimensionality of the scales [1] We tested construct reliabilities of the scales by means of Cronbach's alpha Coefficients of all measures were greater than 65, which implies that reliability is acceptable (Nunnally and Bernstein 1994)

Next, we examined within-method convergent validity by investigating the significance and magnitude of the item loadings All items loaded significantly on their respective construct (minimum t-value = 12 50), and 95% of all items had a standardized loading of at least 50 In addition, we evaluated discriminant validity All chi-square difference tests (1 degree of freedom [d f]) were significant ($p < 05$), which indicates that all pairs of constructs correlated at less than one Subsequently, we included as control variables the

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[1] To assess the construct validity of our focal variable, we conducted an additional CFA in which we included both SMT service climate and its conceptual counterpart "overall service climate" (Schneider, White, and Paul 1998) The results ($\chi^2 = 236 74$, 43 d f , goodness-of-fit index = 97, adjusted goodness-of-fit index = 95, root mean square error of approximation = 057, normed fit index = 98, and comparative fit index = 98) indicate the unidimensionality of both constructs To determine discriminant validity, we used a chi-square difference test (1 d f) to test for unity between the constructs The test showed significance at $p < 05$

TABLE 2
Measures and Measurement Criteria

Employee Data[a]

Measures	Item Mean	Loading	t-Value
SMT Service Climate (n = 6, α = .86 at T1; α = .88 at T2)			
1 Our team is continually working to improve the quality of service we provide to our customers	5 81	78	25 54
2 Our team has specific ideas about how to improve the quality of service we provide to customers	5 32	67	20 94
3 Our team often makes suggestions about how to improve the service quality of our organization	5 01	51	14 85
4 In our team we put a lot of effort in attempting to satisfy customer expectations	5 68	83	28 22
5 No matter how we feel, we always put ourselves out for every customer we serve	5 45	71	22 55
6 Within our team, employees often go out of their way to help customers	5 30	73	23 23
Tolerance for Self-Management (n = 6, α = .89 at T1; α = .90 at T2)			
1 In our team we are permitted to use our own judgment in solving problems	5 27	71	22 50
2 In our team we are encouraged to take initiative	6 09	64	19 48
3 Our team is allowed a high degree of initiative	5 83	81	27 28
4 In our team we are allowed complete freedom in our work	5 54	86	29 94
5 In our team we are allowed to do our work the way we think best	5 25	76	24 73
6 As a team we are able to handle all tasks assigned to us	5 22	72	23 09
Flexibility of Team Members (n = 4, α = 68 at T1; α = .74 at T2)			
1 In our team it is easy to stand in for each other	5 47	66	18 03
2 Most team members know each other's tasks	5 97	58	15 49
3 I have much confidence that my team members would be able to take over my activities	5 69	66	17 94
4 Exchanging team roles and responsibilities causes few problems	4 68	48	12 50
Interteam Support (n = 7; α = 83 at T1; α = .83 at T2) (One Reversed Item)			
1 Other teams act in a responsive manner when we forward customer complaints	4 44	55	16 03
2 The knowledge of other teams assists us in serving customers	4 93	56	16 56
3 The quality of service delivered by other teams to our team is good	4 64	75	23 75
4 Because of insufficient feedback from other teams our service to customers is substandard (reversed item)	3 46	53	15 28
5 Other teams provide good feedback on how to serve customers	4 66	54	15 80
6 The cooperation between teams within the bank is good	4 32	85	28 56
7 The employees of other teams are helpful in solving problems of customers	4 71	75	24 09
Intrateam Support (n = 4; α = .66 at T1; α = .68 at T2)			
1 In our team we help each other in serving the customer	5 06	68	19 88
2 The mutual support of team members is highly valued	5 18	79	23 57
3 Each team member is personally responsible for the assistance of other members in serving the customer	4 98	51	15 03
4 In our team members need not formally be monitored with regard to the assistance of colleagues	5 04	52	14 67

Customer Data

Measures	Item Mean	Loading	t-Value
Customer Perceived Service Quality (n = 8, α = .92)			
1 The extent to which employees make clear appointments	4 10	62	26 17
2 Speed at which the promised information is provided	4 04	65	27 46
3 The friendliness and politeness of employees	4 38	72	31 71
4 The competence of the service by employees	4 07	82	37 20
5 The time taken by employees to serve you	4 34	75	33 12
6 The attention employees pay to you	4 25	82	37 79
7 The extent to which employees show empathy	4 03	81	37 83
8 The readiness of the employees to help you	4 25	86	40 41

TABLE 2
Continued

Share of Customer	Nonroutine Services	Routine Services
Average customer usage rates (%) of the different services offered	Mortgages, loans (53 6%) Investment funds (52 7%) Stocks (43 9%) Insurance (46 5%)	Checking account (95 2%) Savings account (79 1%) Electronic/telephone banking (30 3%) Currency exchange (20 1%) Credit application accounts (44 9%) Travel services (18 7%)

[a] The CFA is based on employee data collected at T1

Notes All t-values are significant at p < 05 For employee data, fit indexes are χ^2 = 925 40, 314 d f , goodness-of-fit index (GFI) = 92, adjusted goodness-of-fit index (AGFI) = 91, root mean square error of approximation (RMSEA) = 049, normed fit index (NFI) = 90, and comparative fit index (CFI) = 93 For customer data, fit indexes are χ^2 = 44 64, 20 d f , GFI = 99, AGFI = 98, RMSEA = 036, NFI = 99, and CFI = 1 00

demographic variables education, organizational tenure, and age, as well as the work-group–design variables team size and percentage of front-office activities (i e , direct customer-contact responsibilities) and nonroutine services, which is a dummy for service type (we coded nonroutine services as one and routine services as zero)

We measured two performance measures, customer perceived service quality and share of customer, using the customer survey We based the scale for service quality on the SERVQUAL instrument developed by Parasuraman, Zeithaml, and Berry (1988) Our goal was to measure the quality of the services delivered by the service employees Therefore, we restricted our measure to eight items that specifically addressed employee-related aspects of quality (Hartline and Ferrell 1996) We measured items on a five-point scale that ranged from 1 = "very dissatisfied" to 5 = "very satisfied " Principal components analysis showed construct validity (we extracted a single factor, loadings for all items were greater than 70) In addition, we conducted CFA to assess measurement properties The fit indexes are reported in Table 2, they demonstrate unidimensionality, construct reliability, and convergent validity of the construct To obtain a measure that we call "share of customer," customers were asked to indicate which types of services they used The share-of-customer score for an SMT pertains to a group mean based on the average number of different service categories used by the customers of a specific team (see Table 2) Finally, we used data from the bank's internal database on the two service types (i e , life insurance policies and investment portfolios for nonroutine services and number of checking and savings accounts for routine services) These parameters reflect the average amount of services sold per team member per year, we used them as a measure of sales productivity

Means, standard deviations, and individual- and group-level correlations between the employee variables are presented in Table 3, which reveals that nonroutine service delivery is associated with higher-educated employees,

TABLE 3
Means, Standard Deviations, and Correlations of Employee Variables at T1

Variables	Mean (s.d.)	1	2	3	4	5	6	7	8	9	10	11
1 Education	4 23 (1 60)[a]	—	– 07	01	– 57***	35***	68***	19	42***	– 06	– 07	01
2 Tenure	3 41 (1 67)[b]	– 28***	—	71***	– 18	19	22*	– 08	01	00	– 21	– 10
3 Age	2 62 (85)[c]	– 16***	70***	—	– 15	24*	27**	18	08	15	– 31**	– 01
4 Team size	20 44 (13 54)[d]	—	—	—	—	– 40***	– 69***	– 06	– 34***	09	– 05	08
5 Front office (%)	47 03 (14 21)[d]	—	—	—	—	—	46***	19	27**	– 04	– 16	01
6 Nonroutine services	59 (50)[d]	—	—	—	—	—	—	13	34***	– 04	– 15	– 10
7 SMT service climate	5 43 (82)	02	– 00	02	—	—	—	—	56***	48***	08	62***
8 Tolerance for self-management	5 54 (89)	09**	04	02	—	—	—	37***	—	25*	10	34***
9 Flexibility of members	5 45 (89)	– 00	– 01	01	—	—	—	38***	24***	—	18	53***
10 Interteam support	4 45 (93)	– 07**	– 07**	– 10***	—	—	—	28***	17***	26***	—	33**
11 Intrateam support	5 07 (94)	– 03	03	06	—	—	—	49***	32***	46***	33***	—

*p < 10
**p < 05
***p < 001

[a] Education consists of seven categories that include various forms of secondary and tertiary education

[b] Tenure consists of six categories that range from "<1 year" to ">5 years "

[c] Age consists of six categories that range from "<21 years old" to ">60 years old "

[d] Means (s d) of team size, front-office work, and nonroutine services are based on the group averages

Notes N = 825 respondents of 61 groups Individual-level correlations are in the lower triangle, and group-level correlations are in the upper triangle Correlations in the upper triangle are the correlations between the group averages smaller team sizes, higher percentages of front-office workers, and higher levels of tolerance for self-management than is routine service delivery In Table 4, group-level means, standard deviations, and (partial) correlations of employee variables and external outcomes are presented The SMT service climate appears to have the highest correlations with customers' perceived service quality Furthermore, the correlations between antecedents and perceived service quality are noticeably weaker when the effect of SMT service climate is accounted for, which implies that the SMT climate mediates the relationships between antecedents and perceived service quality (see Baron and Kenny 1986) Compared with share of customer and sales productivity, the mediating role of SMT service climate is less obvious

Analysis

To justify data aggregation, we examined tolerance for self-management, flexibility of team members, inter- and intrateam support, and SMT service climate on within-group agreement and interdependence First, the average $r_{WG(j)}$ coefficients (ranging from 84 to 95 at T1 and at T2) are high for all variables and show high ratings consistency among employees within groups (James 1982) Second, the intraclass correlation (ICC) (1) coefficients (ranging from 06 to 18 at T1 and from 05 to 14 at T2) indicate that for all variables, a small to moderate part concerns between-group variance To determine interdependence appropriately, it is also relevant to consider group size (Bliese 2000) Therefore, we calculated ICC (2) coefficients, because this measure of interdependence accounts for group size Of the ICC (2) values, 90% are greater than 50, which provides evidence for reliable group means and enables the detection of group-level relationships, even in the case of relatively small ICC (1) values (Bliese 2000)

We tested H_1–H_5 with employee data at T1 and estimated multilevel models using MLwiN software (Rasbash et al 2000) We first included the control variables and the antecedents (Model A1) We then specified interactions between the dummy variable nonroutine services and the antecedents (Model A2) [2] Model specification is provided in the Appendix

To compare individual- and group-level effects of the antecedents on SMT service climate, we split the antecedent variables into the group mean and within-group deviation score (i e , individual score – group mean) [3] The coefficient of the group means reflects the group-level effect, whereas the coefficient of the within-group deviation scores reflects the individual-level effect (Bryk and Raudenbush 1992, Snijders and Bosker 1999) To interpret the coefficients appropriately, we needed to know whether the individual- and group-level coefficients were equal First, when both coefficients are significant and equal, the variable functions principally at the individual level, and there is no separate main effect at the group level Second, when only the individual-level coefficient is significant and the group-level coefficient is not significant, the effect is solely based on social comparison *within* the group Finally, when both the group- and the individual-level coefficients are significant but differ in magnitude, there is both an individual-level effect and an independent group-level effect (Van Yperen and Snijders 2000)

Table 5 contains the results of the multilevel analyses There are positive individual-level effects of tolerance for self-management, flexibility, and inter- and intrateam support on the SMT service climate, in support of H_1–H_3 In addition, we tested the cross-level hypothesis (H_4) A comparison of the individual- and group-level coefficients shows that tolerance for self-management and flexibility have significant, positive group-level effects on the SMT service climate However, these do not significantly differ from the individual-level effects Thus, the results indicate no support for H_{4a} and H_{4b} The group-level effect of interteam support is nonsignificant and significantly weaker than its individual-level counterpart Therefore, H_{4c} is rejected Only intrateam support shows a significant, positive group-level effect on SMT service climate that is significantly stronger than its individual-level effect, in support of H_{4d}

With respect to the control variables, our findings show a significant, positive group-level effect of age on SMT service-climate perceptions that is significantly stronger than its individual-level counterpart Similarly, we find a significant, negative group-level effect of organizational tenure on the outcome variable At the same time, however, although the group-level predictors are highly positively correlated, each has a negligible correlation with the SMT service climate Yet the inclusion of group-level tenure as a second predictor of the SMT service climate in addition to group-level age significantly increases the model fit ($\chi^2_{(1)}$ = 5 68, $p <$ 05) and results in significant effects of both predictors on the SMT service climate In contrast, inclusion of age as a second predictor beyond tenure results in a better model fit ($\chi^2_{(1)}$ = 5 56, $p <$ 05) and significant effects for the two predictors Therefore, it appears that both tenure and age can be considered suppressor variables that mutually suppress each other's irrelevant variance for the prediction of the SMT service climate Essentially, suppressors partial out the variance in the predictor variable that is due to measurement artifacts (Hinkle, Wiersma, and Jurs 1994) Therefore, to determine the effects of tenure and age on SMT service climate adequately, it is necessary to include both variables in the model Finally, the results show that nonroutine service tasks have a positive impact on climate perceptions

In addition, we tested whether the relationships between antecedents and the SMT service climate differ across service settings by specifying interactions between nonroutine services and antecedents The inclusion of the interaction terms does not significantly improve the fit of Model A2 compared with Model A1 We found one significant, posi-

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[2] To control for multicollinearity, we inspected the variance inflation factors of the variables The control variables and the antecedents yielded values less than 3 9 and 2 0, respectively, indicating the absence of serious multicollinearity problems (Kleinbaum, Kupper, and Muller 1988)

[3] Within-group deviation is similar to group mean-centering In all analyses, we group mean-centered individual-level variables and grand mean-centered group-level variables to (1) distinguish within- and between-group variance, (2) reduce multicollinearity, and (3) facilitate model estimation (see Bryk and Raudenbush 1992)

TABLE 4
Group-Level Means, Standard Deviations, and Correlations of Employee Variables and External Outcomes

Variables	Mean (s.d.)	N = 61 1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Perceived service quality$_{T2}$	4 17 (16)	—					20	11	−02	07		_−07_	_14_	_−13_	_−05_
2 Share of customer$_{T2}$	2 34 (65)[a]	−14	—				−23*	08	33**	30**		_−14_	_−14_	_14_	_19_
3 Sales productivity$_{T2}$	525 73 (477 92)[a]	−25*	63***	—			−33**	07	13	19		_−26_*	_−05_	_11_	_27_**
4 Nonroutine services	59 (50)	24*	−69***	−97***	—										
5 SMT service climate$_{T1}$	5 42 (35)	40***	12	−21	13	—									
6 Tolerance for self-management$_{T1}$	5 52 (43)	37***	−12	−38***	34***	56***	—								
7 Flexibility of members$_{T1}$	5 41 (40)	28**	13	−04	−04	48***	25*	—							
8 Interteam support$_{T1}$	4 44 (48)	02	33***	11	−15	08	10	18	—						
9 Intrateam support$_{T1}$	5 03 (38)	30**	31**	02	−10	62***	34***	53***	33**	—					
10 SMT service climate$_{T2}$	5 44 (35)	_25_*	_−11_	_−32_**	_29_**	_63_***	_50_***	_42_***	_07_	_36_***	—				
11 Tolerance for self-management$_{T2}$	5 61 (41)	_06_	_−18_	_−37_***	_34_**	_32_**	_62_***	_16_	_06_	_14_	_47_***	—			
12 Flexibility of members$_{T2}$	5 51 (33)	_23_*	_−18_	_−19_	_16_	_42_***	_36_***	_38_***	_−08_	_30_**	_46_***	_40_***	—		
13 Interteam support$_{T2}$	4 54 (50)	_−08_	_12_	_04_	_−04_	_−06_	_03_	_19_	_57_***	_20_	_19_	_39_***	_32_**	—	
14 Intrateam support$_{T2}$	5 17 (52)	_06_	_12_	_10_	_−11_	_40_***	_14_	_11_	_24_	_36_***	_41_***	_32_**	_50_***	_40_***	—

*$p < 10$

**$p < 05$

***$p < 001$

[a] There are large differences between routine and nonroutine services with respect to share of customer (routine services, mean [s d] = 1 97 [43], nonroutine services, mean [s d] = 2 88 [54]) and sales productivity (routine services, mean [s d] = 1076 26 [171 32], nonroutine services, mean [s d] = 143 37 [67 77])

Notes For italicized correlations, N = 56 Correlations among variables are represented in the lower triangle Coefficients in the upper triangle are the partial correlations between antecedents and outcomes For the partial correlations with antecedents at T1, we partialled out the effect of SMT service climate$_{T1}$, for antecedents at T2, we partialled out the effect of SMT service climate$_{T2}$

TABLE 5
Results of the Multilevel Analyses

	Model A1		Model A2		
	SMT Service Climate$_{T1}$		SMT Service Climate$_{T1}$		
	Coefficient (Standard Errors)[a]	Magnitude Difference[b]	Coefficient (Standard Errors)[a]	Magnitude Difference[b]	Hypothesis
Intercept	573 (713)		827 (766)		
Individual-Level Control Variables					
Education	– 017 (017)		– 018 (017)		
Tenure	– 027 (021)		– 021 (021)		
Age	040 (039)		036 (040)		
Group-Level Control Variables					
Education	– 015 (063)	003 (065)	– 011 (067)	006 (070)	
Tenure	– 225 (082)**	– 198 (085)**	– 219 (084)**	– 198 (087)*	
Age	361 (153)**	322 (159)*	317 (160)*	277 (167)*	
Team size	004 (003)		004 (003)		
Front office (%)	– 082 (199)		– 085 (208)		
Nonroutine services	179 (101)*		182 (106)*		
Individual-Level Antecedents					
Tolerance for self-management	220 (032)**		224 (031)**		H_1
Flexibility of team members	163 (033)**		170 (033)**		H_2
Interteam support	133 (034)**		134 (034)**		H_{3a}
Intrateam support	238 (031)**		231 (032)**		H_{3b}
Group-Level Antecedents					
Tolerance for self-management	219 (080)**	000 (086)	193 (082)**	– 021 (088)	H_{4a}
Flexibility of team members	160 (094)*	– 008 (099)	217 (099)*	055 (105)	H_{4b}
Interteam support	– 006 (071)	– 141 (077)*	– 039 (074)	– 172 (080)*	H_{4c}
Intrateam support	497 (100)**	262 (105)**	460 (102)**	224 (107)*	H_{4d}
Cross-Level Interactions: Individual-Level Antecedents × Nonroutine Service Type					
Tolerance			– 035 (025)		
Flexibility			– 042 (028)		
Interteam			– 021 (027)		
Intrateam			034 (027)		
Group-Level Interactions: Group-Level Antecedents × Nonroutine Service Type					
Tolerance			– 007 (031)	– 003 (031)	H_{5a}
Flexibility			074 (033)*	086 (034)**	H_{5b}
Interteam			– 002 (031)	002 (031)	H_{5c}
Intrateam			– 047 (036)	– 054 (037)	H_{5d}
Increase in Model Fit	χ^2 = 362 72 (21 d f)**		χ^2 = 11 41 (8 d f)		
Explained Variance (%)					
Individual level	37 9%		38 2%		
Group level	58 9%		60 0%		

*$p <$ 05
**$p <$ 01
[a]Unstandardized regression coefficients
[b]We tested differences in magnitude between individual- and group-level coefficients by means of raw-score analyses, and these are reflected in the presented group-level coefficients
Notes Significance is based on one-tailed tests

tive interaction of nonroutine services × team member flexibility at the group level The addition of this interaction term to the model leads to a significant increase in model fit ($\chi^2_{(1)}$ = 5 92, $p <$ 05), indicating support for H_{5b} Specifically, the magnitude of this group-level interaction effect is significantly stronger than its individual-level counterpart The specified group-level interactions of nonroutine services with tolerance for self-management and inter- and intrateam support appear to be nonsignificant This implies that there are no differences in group-level effects of the antecedents across service types Thus, H_{5a}, H_{5c}, and H_{5d} are rejected Finally, the percentage of explained variance at the group level is higher than that at the individual level, indicating that between-group differences of SMT service climate are more effectively explained than within-group differences

To substantiate our results, we performed additional analyses The results of the analyses are presented in Table 6 First, we conducted a lagged analysis and investigated the delayed effects of the antecedent variables at T1 on SMT service climate at T2 (Model B1) To control for an employee's previous evaluation of SMT service climate at T1, we included this variable as an additional predictor (see Bolton and Drew 1991) The reported estimates reveal a somewhat weaker but largely consistent pattern as compared with the cross-sectional analysis (Model A2) Specifically,

TABLE 6
Results of Additional Multilevel Analyses

	Model B1 (Lagged Analysis)		Model B2 (Gibbs Sampling)[c]	
	SMT Service Climate$_{T1}$		SMT Service Climate$_{T2}$	
	Coefficient (Standard Errors)[a]	Magnitude Difference[b]	Coefficient (Standard Errors)[a]	Magnitude Difference[b]
Intercept	– 255 (967)		842 (773)	
SMT Service Climate$_{T1}$	334 (051)**			
Individual-Level Control Variables				
Education	– 001 (024)		– 018 (017)	
Tenure	000 (030)		– 021 (021)	
Age	141 (060)**		035 (040)	
Group-Level Control Variables				
Education	– 064 (086)	– 045 (094)	– 012 (069)	006 (071)
Tenure	– 189 (092)*	– 192 (102)*	– 219 (085)**	– 196 (088)*
Age	496 (188)**	363 (207)*	316 (163)*	278 (169)*
Team size	004 (004)		004 (003)	
Front office (%)	– 308 (280)		– 088 (214)	
Nonroutine services	265 (145)*		182 (107)*	
Individual-Level Antecedents				
Tolerance for self-management	138 (058)**		223 (032)**	
Flexibility of team members	164 (073)*		169 (034)**	
Interteam support	089 (049)*		132 (031)**	
Intrateam support	100 (051)*		232 (031)**	
Group-Level Antecedents				
Tolerance for self-management	183 (099)*	019 (118)	194 (084)*	– 021 (090)
Flexibility of team members	121 (119)	040 (136)	214 (101)*	064 (106)
Interteam support	009 (087)	– 076 (106)	– 039 (075)	– 168 (083)*
Intrateam support	335 (121)**	242 (138)*	459 (105)**	214 (109)*
Cross-Level Interactions: Individual-Level Antecedents × Nonroutine Service Type				
Tolerance	– 009 (038)		– 035 (025)	
Flexibility	052 (053)		– 041 (027)	
Interteam	001 (037)		– 023 (025)	
Intrateam	– 054 (039)		035 (027)	
Group-Level Interactions:Group-Level Antecedents × Nonroutine Service Type				
Tolerance	– 014 (046)	– 003 (050)	– 007 (031)	– 002 (032)
Flexibility	078 (044)*	083 (048)*	074 (033)*	082 (034)**
Interteam	066 (038)*	060 (041)	– 002 (032)	002 (032)
Intrateam	– 082 (052)	– 058 (057)	– 046 (037)	– 054 (038)
Explained Variance (%)				
Individual level	42 3%		37 7%	
Group level	59 0%		57 9%	

*p < 05

**p < 01

[a] Unstandardized regression coefficients

[b] We tested differences in magnitude between individual- and group-level coefficients by means of raw-score analyses, and these are reflected in the presented group-level coefficients

[c] Model B2 Gibbs sampling (10,000 iterations)

Notes Significance is based on one-tailed tests these findings empirically demonstrate that the antecedents have a positive impact on the development of the SMT service climate over time Second, to test the accuracy and stability of parameter estimates (Model B2), we conducted the simulation procedure using Gibbs sampling (Gilks, Richardson, and Spiegelhalter 1996)[4] The parameter values we obtained through this simulation were fairly similar to the Model A2 estimates Third, we performed the Chow F_c test to determine whether there had been a structural change in the antecedent–SMT service climate relationships between T1 and T2 The Chow F_c test reported no significant F value ($F_{25, 1435} = 1\ 00, p = \ 46$), which indicates that there were no structural alterations over time Overall, this model validation indicates insensitivity of the results to various time frames and different estimation methods, and it confirms consistency in findings and provides additional support for their managerial relevance

Subsequently, we investigated the effect of SMT service climate at T1 on several team outcomes at T2 To assess the linkage between SMT service climate and its consequences empirically, we aggregated employee and customer perceptions to the group level It has been argued that customers primarily observe the outcome of integrative working relationships among multiple employees (Allen and Grisaffe 2001) Furthermore, outgroup-homogeneity theory postulates that people tend to perceive other groups as more uniform than their own group (Quattrone and Jones 1980) This means that whereas employees may have a relatively detailed view of their own team's performance, external customers are likely to generalize the quality of service offered by one or multiple team members as a common characteristic of a homogeneous out-group Moreover, it was not possible to match empirically employee and customer evaluations and productivity criteria at the individual level of analysis

We tested H_6–H_8 using a multivariate regression model formulated as a two-level hierarchical linear model Level 1 refers to the dependent variables indexed by h = 1, , m, and Level 2 reflects the teams j = 1, , N Thus, each measurement of a dependent variable for some team is indicated by a separate line in the data matrix, which contains the values j, h, Y_{hj}, x_{1j} and those of other explanatory variables To formulate the multivariate regression model as a hierarchical linear model, we used the dummy variables d_1 to d_m to indicate the dependent variables (i e , perceived service quality_{T2}, share of customer_{T2}, and sales productivity_{T2}) Dummy variable d_h is equal to one or zero, depending on whether the data line refers to the dependent variable Y_h or to another dependent variable With the dummy variables, the regression models for the m dependent variables can be integrated into one two-level hierarchical model with the following expression

$$(1)\quad Y_{hj} = \sum_{s=1}^{m} \gamma_{0s} d_{shj} + \sum_{k=1}^{p} \sum_{s=1}^{m} \gamma_{ks} d_{shj} x_{kj} + \sum_{s=1}^{m} e_{sj} d_{shj}$$

We multiplied all variables (including the constant) by the dummy variables Note that in the sums over s = 1, , m, only the term for s = h renders a contribution, all other terms disappear The following equation involves a simplified representation of Equation 1

$$(2)\quad Y_{hj} = \gamma_{0h} + \gamma_{1h}\text{SERVCLIM}_{T1j} + \gamma_{2h}\text{NROUT}_j +$$

$$\gamma_{3h}(\text{SERVCLIM}_{T1j} \times \text{NROUT}_j)_j + e_{hj},$$

where Y_{hj} is the measurement on the hth variable for group j, SERVCLIM_{T1} is the team's SMT service-climate average at T1, and NROUT reflects the type of service

Our results in Table 7 reveal significant, positive effects of SMT service climate_{T1} on perceived service quality_{T2} and share of customer_{T2} and a significant, negative effect on sales productivity_{T2} The findings support H_6 and H_7 Furthermore, the service-type dummy "nonroutine services" is positively related to customer perceived service quality but is negatively related to share of customer and sales productivity In addition, we tested interactions between service type and the SMT service climate There is a positive interaction effect of nonroutine services × SMT service climate on perceived service quality, but no significant interactions appear for share of customer and sales productivity Thus, H_{8a} is supported, and H_{8b} and H_{8c} are rejected

Discussion

The key objective of our study was to analyze the chain of events between perceptions of boundary-spanning service employees organized in SMTs and critical marketing performance criteria We developed the construct of SMT service climate and empirically demonstrated that it plays a pivotal role in the prediction of SMT performance dimensions We have empirical verification that tolerance for self-management, flexibility, and inter- and intrateam support have a direct, positive impact on individual employees' service-climate perceptions In addition, we found that the group-level measure of intrateam support adds uniquely to the explanation of SMT service-climate perceptions Moreover, we found that service type moderates the group-level effect of flexibility Both effects persist over time, which nuances Mohammed, Mathieu, and Bartlett's (2002) general observation that perceptual agreement among team members with respect to interpersonally oriented behaviors is crucial to the performance of the team's core tasks For boundary-spanning service delivery, shared perceptions of support and team flexibility are conducive to the creation of a climate related to the SMT's core task Our results suggest that the dynamics of supportive behavior in the SMT's providing service to customers have crystallized into a coherent, collective perception and that beliefs of any team member are likely to be influenced by the attitudes and behavior of other members This seems important because service delivery is heterogeneous across employees, and delivery of consistent service quality is a constant challenge Further-

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[4] Gibbs sampling works by simulating a new value for each parameter from its conditional distribution and by assuming that the current values for the other parameters are the true values

Table 7
The Results of the SMT Service Climate–Outcome Relationships

	Model C1		Model C2		
	Coefficient (Standard Errors)[a]		Coefficient (Standard Errors)[a]		Hypothesis
SERVCLIMT1 → $QUAL_{T2}$[b]	941	(308)**	969	(295)**	H_{6a}
NROUT → $QUAL_{T2}$	501	(313)	510	(299)*	
$SERVCLIM_{T1}$ × NROUT→ $QUAL_{T2}$			336	(134)**	H_{8a}
$SERVCLIM_{T1}$ → $SHARE_{T2}$	275	(119)**	268	(118)**	H_{6b}
NROUT → $SHARE_{T2}$	– 953	(121)**	– 955	(119)**	
$SERVCLIM_{T1}$ × NROUT→ $SHARE_{T2}$			– 082	(053)	H_{8b}
$SERVCLIM_{T1}$ → $SPROD_{T2}$	–73 862	(30 076)**	–72 430	(29 961)**	H_7
NROUT → $SPROD_{T2}$	–922 734	(30 539)**	–922 305	(30 403)**	
$SERVCLIM_{T1}$ × NROUT→ $SPROD_{T2}$			16 811	(13 570)	H_{8c}
Residual Between-Groups Covariance Terms					
$\sigma_h^2 = var(e_{hj})$, (h = 1)	1 417	(256)	1 298	(235)	
$\sigma_h^2 = var(e_{hj})$, (h = 2)	211	(039)	206	(037)	
$\sigma_h^2 = var(e_{hj})$, (h = 3)	13,507 870	(2440 253)	13,385 760	(2423 142)	
$\sigma_{12} = cov(e_{1j}, e_{2j})$	– 041	(070)	– 006	(066)	
$\sigma_{13} = cov(e_{1j}, e_{3j})$	6 225	(17 704)	– 871	(16 872)	
$\sigma_{23} = cov(e_{2j}, e_{3j})$	–7 755	(6 927)	–6 144	(6 773)	
Increase in model fit [c]	χ^2 = 232 45 (6 d f)**		χ^2 = 10 32 (3 d f)*		
Increase in model fit [d]	χ^2 = 1 71 (3 d f)		χ^2 = 85 (3 d f)		

*$p <$ 05
**$p <$ 01
[a] Unstandardized regression coefficients
[b] As we aggregated the scale of perceived service quality to the group level, we calculated $r_{WG(J)}$–, ICC (1)–, and ICC (2)– coefficients (respectively 96, 04, and 51) to determine within-group agreement and interdependence
[c] Increase in model fit with inclusion of the predictor variables
[d] Increase in model fit with inclusion of the covariance terms among the outcome variables
Notes Significance is based on one-tailed tests

more, because nonroutine services are relatively more complex and require in-depth know-how, there is a greater need to integrate mechanisms and group-embedded expertise when addressing heterogeneous, unpredictable customer demands on the front line The group-level interaction effect signifies that a collective understanding of one another's roles and shared beliefs about the capability to perform various roles are particularly important for service-climate perceptions in SMTs that deliver nonroutine services This extends Druskat and Pescosolido's (2002) finding that in complex task conditions, there is a higher need for information exchange from manufacturing SMTs to the setting of nonroutine service delivery In contrast, no additional cross-level effects (i e , beyond individual perceptions) were reported for tolerance for self-management and interteam support This implies that boundary-spanning service employees' perceptions of the impact of climate-defining determinants are based primarily on personal cognitions and interpretations of the team environment rather than on a property of the team

This study extends previous research by taking into account a comprehensive set of SMTs' marketing performance measures Our results demonstrate that SMT service-climate perceptions have a positive impact on customer perceived service quality and share of customer and a negative effect on sales productivity We also find that the positive effect of customer perceived quality is significantly stronger for nonroutine services than for routine services Thus, the direct relationship between organizational service climate and perceived service quality in financial services reported by Schneider, White, and Paul (1998) holds at the team level, but the strength of the relationship seems to be contingent on the service type Particularly in the delivery of nonroutine services, which is often aimed at fulfilling specific customer needs, a climate focusing on service excellence appears to provide added value from customers' perspectives In contrast, the relatively high within-group variability of SMT service climate for the routine service setting may have weakened the relationship between SMT service climate and perceived service quality

Although SMT service climate contributes to a higher share of customer, it is associated with lower sales productivity levels These results and the low correlations between the effectiveness measures may indicate what has been labeled the "performance paradox," a phenomenon that has been encountered in previous studies on firm performance (Meyer and Gupta 1995) and team performance (Spreitzer, Cohen, and Ledford 1999) An SMT climate for service does not necessarily improve all aspects of frontline service performance This confirms Anderson, Fornell, and Rust's (1997) contention that trade-offs between different performance parameters are particularly applicable to services, and it emphasizes the necessity to set off customer parameters against productivity parameters to create an optimal balance

Theoretical Implications

Our study contributes to the theoretical literature on SMTs in four ways First, our findings illustrate the relevance of the SMT service climate in explaining the divergent findings encountered in the SMT literature Although service climate has been studied extensively at the organizational level, the concept has been virtually unexplored in relation to SMTs We conducted our study in the context of financial consumer services Further research should assess the generalizability of our findings to other service settings (e g , technical support, business-to-business services) Although we unequivocally demonstrate the impact of service climate on important performance parameters, the body of work on this construct in the marketing and organizational behavior areas suggests that there is still much to be learned about the nature and scope of the SMT service climate as it relates to team performance Following Schneider, Salvaggio, and Subirats (2002), we modeled within-team variability by taking the standard deviation of the SMT service climate as a measure of cohesiveness Notably, significant, positive interaction effects of SMT service climate × SMT climate cohesiveness on customer perceived service quality and sales productivity emerged These findings demonstrate the relevance of perceptual agreement on SMT climate as a moderator of the relationship between SMT service climate and the outcome variables However, the effect of cohesiveness did not hold when we specified conditions for service type, possibly because of relatively strong differences in within-group variability between routine and nonroutine service delivery Additional insight is needed into the contingencies that influence the relationship between SMT service climate and effective customer service

Second, our research contributes to a better understanding of which factors shape a climate for service within boundary-spanning SMTs Both team- and company-related characteristics influence team members' perceptions of the SMT service climate Our set of predictor variables pertains predominantly to interpersonally oriented behaviors In further research, the focus might be more on the impact of technical–administrative or task-related behavior in SMTs

Third, our study advances the understanding of the impact of predictor-criterion relationships across levels of analysis Although recent multilevel research has recognized the importance of comparing relationships across levels (Ostroff, Kinicki, and Clark 2002), studies have focused almost exclusively on methodological issues Additional investigation is needed to address the underlying theoretical mechanisms that cause these differences For example, our findings on interteam support suggest the relevance of considering distortions in employee perceptions during comparison of relationships across levels The purpose of ratings, performance norms, and social dynamics may affect ratings of situational elements (Ostroff 1993) It makes a difference whether respondents evaluate their own team or other (rival) teams within the organization In other words, the team members' various motives and interests influence their workplace evaluation Thus, conceptual development is required on implicit and explicit processes among individual service employees, their colleagues, and the broader organizational context

Fourth, our findings present a balanced perspective of service climate as a success factor related to SMTs Although the growth and importance of SMTs has been studied, research has neglected how SMTs are related to important business-performance measures The study empirically demonstrates that all benefits of this factor may not be realized simultaneously and that inherent trade-offs are made The divergent effects of the SMT service climate on customers' perceived service quality and share of customer, rather than sales productivity, may motivate researchers to investigate complementary mediator variables that explain the performance paradox between customer- and productivity-based measures Future conceptual models need to include more productivity-oriented performance mediators (e g , cost consciousness) that are related to SMTs' planning and control activities (Singh 2000)

Managerial Implications

Our findings suggest several managerial implications Given the group-level impact of intrateam processes, competency development and measurement with regard to intrateam support and flexibility should be aligned at the team level Team-level interventions that are effective in creating a collective sense of support in the team include group exercises aimed at consensus building on, for example, service delivery standards, joint problem identification and analysis of customer complaints, the provision of assistance to colleagues in dealing with customers, and groupware and shared databases that facilitate information exchange In addition, performance assessments should be related to the team's collective capabilities in providing internal and external service Cross-training programs that focus on the ability of specialist employees to promote interchangeable expertise within nonroutine SMTs may be offered Particularly for teams delivering complex and extended services, group meetings should be devoted to increasing team members' understanding of one another's tasks through role-play exercises Cases on handling complex customer requests may be used to demonstrate problem solving and decision-making skills

Our findings show that it is important to create a context that is supportive to self-management on the firm's front line, one that goes beyond formally loosening the managerial reigns Tolerance for self-management entails creating a sense of personal freedom and control with respect to, for example, meeting customer expectations (see Bowen and Lawler 1992) However, the authority to perform in the interest of the customer as a team should be accompanied by the knowledge and skills as well as the resources to analyze team performance data from a business perspective, because this is one of the essential self-managing responsibilities of the team In addition to the dissemination of power, timely feedback and strategic information on, for example, the impact of SMT decisions on customer perceptions and company profitability should be distributed and discussed within the team Management should play a leading role in coaching SMTs in their role as empowered customer–company interfaces This calls for active engagement in plenary discussions on the firm's service strategy, involvement in training programs for skills in problem solving and customer-complaint handling, process analysis techniques, and performance assessments, and embedding of the role of SMTs in the social structure of the organization Support from other teams is also an important driver of service-climate perceptions Interteam support may be encouraged through job-rotation schemes, cross-training between SMTs on customer issues, and joint customer visits Kirkman and Rosen (2000) refer to an insurance company that uses so-called bridge teams that are responsible for facilitating the communication and cooperation between service teams Because the impact of extrateam factors occurs predominantly at the individual level, managerial strategies need not focus exclusively on team-level interventions Personalized training in conjunction with plenary meetings and internal media may be used to reach employees and to strengthen the impact of climate-shaping antecedents for teams of frontline service providers

A potentially counterintuitive and important finding suggests that firms should be aware of the SMT service climate's potential to have an adverse effect on sales productivity Thus, SMTs may need both a productivity and a service orientation if management expects them to affect different outcomes positively If the costs of service operations need to be reduced (a likely reality today), SMTs need to be involved in developing efficiency improvements, such as designing "smarter" service-delivery routines or identifying opportunities for cross- or up-selling during service encounters When there is a need to work simultaneously on multiple drivers of different performance parameters, the results may vary across service types Moreover, it is unlikely that all desirable outcomes will manifest at the same time Our findings confirm that the impact of SMT climate can be observed over an extended period of time and can provide evidence of the potential to incorporate time frames in diagnostic assessments of the effectiveness of SMTs

Appendix
Model Specification

The basic multilevel regression model (Model A2) consists of a Level 1 (individual-level) submodel that specifies the effects of the within-group deviation variables and a Level 2 (group-level) submodel that specifies the effects of group-level variables The Level 1 submodel is expressed as follows

$$\text{(A1)}\quad \mathrm{SERVCLIM}_{ij} = \beta_{0j} + \beta_{1j}\mathrm{EDUC}_{ij} + \beta_{2j}\mathrm{TEN}_{ij} + \beta_{3j}\mathrm{AGE}_{ij} + \beta_{4j}\mathrm{TOL}_{ij} + \beta_{5j}\mathrm{FLEX}_{ij} + \beta_{6j}\mathrm{INTER}_{ij} + \beta_{7j}\mathrm{INTRA}_{ij} + e_{ij}$$

The Level 2 submodel is expressed as follows

$$\begin{aligned}\text{(A2)}\quad \beta_{0j} = {} & \gamma_{00} + \gamma_{01}\mathrm{EDUC}_j + \gamma_{02}\mathrm{TEN}_j + \gamma_{03}\mathrm{AGE}_j + \gamma_{04}\mathrm{SIZE}_j \\ & + \gamma_{05}\mathrm{FRONT}_j + \gamma_{06}\mathrm{NROUT}_j + \gamma_{07}\mathrm{TOL}_j + \gamma_{08}\mathrm{FLEX}_j \\ & + \gamma_{09}\mathrm{INTER}_j + \gamma_{010}\mathrm{INTRA}_j + \gamma_{011}(\mathrm{TOL}_j \times \mathrm{NROUT}_j)_j \\ & + \gamma_{012}(\mathrm{FLEX}_j \times \mathrm{NROUT}_j)_j + \gamma_{013}(\mathrm{INTER}_j \times \mathrm{NROUT}_j)_j \\ & + \gamma_{014}(\mathrm{INTRA}_j \times \mathrm{NROUT}_j)_j + u_{0j},\end{aligned}$$

$$\text{(A3)}\quad \beta_{qj} = \gamma_{q0} + \gamma_{q1}\mathrm{NROUT}_j + u_{qj} \text{ for } q\ (= 4, \quad , 7), \text{ and}$$

$$\text{(A4)}\quad \beta_{qj} = \gamma_{q0} \text{ for } q\ (= 1, \quad , 3),$$

where i denotes individuals, j indicates groups, SERVCLIM is employees' SMT service-climate appraisal, EDUC, TEN, and AGE refer to employees' education, tenure, and age, respectively, SIZE, FRONT, and NROUT are the size of the team, the percentage of front-office workers in the team, and type of service, respectively, and TOL, FLEX, INTER, and INTRA are tolerance for self-management, team member flexibility, interteam support, and intrateam support, respectively Substitution of Equations A2–A4 in Equation A1 yields the following multilevel model

$$\begin{aligned}\text{(A5)}\quad \mathrm{SERVCLIM}_{ij} = {} & \gamma_{00} + \gamma_{10}\mathrm{EDUC}_{ij} + \gamma_{20}\mathrm{TEN}_{ij} \\ & + \gamma_{30}\mathrm{AGE}_{ij} + \gamma_{40}\mathrm{TOL}_{ij} + \gamma_{50}\mathrm{FLEX}_{ij} \\ & + \gamma_{60}\mathrm{INTER}_{ij} + \gamma_{70}\mathrm{INTRA}_{ij} \\ & + \gamma_{80}(\mathrm{TOL}_{ij} \times \mathrm{NROUT}_j)_{ij} \\ & + \gamma_{90}(\mathrm{FLEX}_{ij} \times \mathrm{NROUT}_j)_{ij} \\ & + \gamma_{100}(\mathrm{INTER}_{ij} \times \mathrm{NROUT}_j)_{ij} \\ & + \gamma_{110}(\mathrm{INTRA}_{ij} \times \mathrm{NROUT}_j)_{ij} \\ & + \gamma_{01}\ \mathrm{EDUC}_j + \gamma_{02}\mathrm{TEN}_j + \gamma_{03}\mathrm{AGE}_j \\ & + \gamma_{04}\mathrm{SIZE}_j + \gamma_{05}\mathrm{FRONT}_j \\ & + \gamma_{06}\mathrm{NROUT}_j + \gamma_{07}\mathrm{TOL}_j + \gamma_{08}\mathrm{FLEX}_j \\ & + \gamma_{09}\mathrm{INTER}_j + \gamma_{010}\mathrm{INTRA}_j \\ & + \gamma_{011}(\mathrm{TOL}_j \times \mathrm{NROUT}_j)_j \\ & + \gamma_{012}(\mathrm{FLEX}_j \times \mathrm{NROUT}_j)_j \\ & + \gamma_{013}(\mathrm{INTER}_j \times \mathrm{NROUT}_j)_j \\ & + \gamma_{014}(\mathrm{INTRA}_j \times \mathrm{NROUT}_j)_j \\ & + u_{0j} + u_{1j} + u_{2j} + u_{3j} + u_{4j} + e_{ij}\end{aligned}$$

The individual-level error term e_{ij} is normally distributed with a mean of zero and variance of σ^2 The random effects $u_{qj}(q = 0, 4, 5, 6, 7)$ are multivariate normal distributed over teams with an expected value of zero and variance $(u_{qj}) = \tau_{qq}$ Finally, u_{qj} is the unique deviation of group j from the overall effect on the intercept (β_{0j}) while accounting for the group-level predictor variables

We specified the coefficients β_{0j}, β_{4j}, $\quad$, β_{7j} as random coefficients (i e , we allowed them to vary across groups) We constrained the predictor variables β_{1j}, β_{2j}, and β_{3j} to be invariable across groups (i e , we included no random term on Level 2 for these coefficients) In theory, we could specify all β_{qj}'s as random effects, however, statistically, such a model is not recommended, because it impedes model convergence and results in unstable parameter estimates (Bryk and Raudenbush 1992)

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Rik Pieters & Michel Wedel

Attention Capture and Transfer in Advertising: Brand, Pictorial, and Text-Size Effects

The three key ad elements (brand, pictorial, and text) each have unique superiority effects on attention to advertisements, which are on par with many commonly held ideas in marketing practice. This is the main conclusion of an analysis of 1363 print advertisements tested with infrared eye-tracking methodology on more than 3600 consumers. The pictorial is superior in capturing attention, independent of its size. The text element best captures attention in direct proportion to its surface size. The brand element most effectively transfers attention to the other elements. Only increments in the text element's surface size produce a net gain in attention to the advertisement as a whole. The authors discuss how their findings can be used to render more effective decisions in advertising.

Magazines are an important advertising medium, as illustrated by their projected 13% share of ad spending in 2003 in the United States and the even greater shares in countries such as France (32%), Germany (24%), Italy (15%), the Netherlands (27%), and the United Kingdom (16%) (International Federation of the Periodical Press 2003). To reach consumers effectively and to communicate with them, print advertisements need to cut through the clutter of competing advertisements and editorial messages. Because the typical magazine contains more than 50% advertising, consumers cannot fully absorb all the advertising and editorial content. Failures to capture consumers' attention (i.e., to attract and retain it) reduce the effective reach of print advertising, thereby increasing the cost-per-thousand and jeopardizing the attainment of long-term communication and marketing goals. Because competitive clutter is on the rise, some industry experts argue that "the power of marketing is eroding . . . from lack of attention" (Sacharin 2001, p. 3). Attention has been referred to as the scarcest resource in today's business (Adler and Firestone 1997, Davenport and Beck 2001). This makes the capture of consumers' attention an increasingly important aim for print advertising.

The general belief underlying print advertising tactics is that size matters: larger advertisements attract and retain more attention, and the larger an advertisement's brand, pictorial, and text elements, the more attention they should capture. However, the precise attention effects of brand, pictorial, and text sizes have been vigorously debated (Aitchinson 1999, Maloney 1994, Moriarty 1986, Rossiter and Percy 1997) but rarely empirically studied. Much is known about the influence of the size of the entire advertisement on consumers' memory (Diamond 1968, Finn 1988, Hanssens and Weitz 1980, Twedt 1952), but attention to advertisements cannot be directly inferred from consumers' memory for them, because different psychological processes are involved with distinct antecedents. There is no research on the simultaneous effects of the size of the brand, pictorial, and text elements on consumers' attention patterns. We believe that this is surprising, because the element sizes are key variables that are manipulated jointly in advertising design, and changes in each of them may affect attention to the others and to the entire advertisement. Moreover, we are not aware of research that has systematically examined the influence of the brand-element size in advertising, despite the element's central role in the communication process and the surge of interest in branding and visual brand-identity issues.

Our research aims to enhance knowledge about attention to advertising as follows. First, we examine the contribution of the surface size of the brand, pictorial, and text elements of advertisements in capturing consumers' attention to the entire advertisement. Second, we identify the extent to which consumers' attention to the brand, pictorial, and text elements of advertisements increases with the surface size devoted to them. Third, we assess potential carryover effects of attention to ad elements. Specifically, because consumers' attentional resources are limited, their increasing attention to one ad element may be at the expense of other ad elements, which reveals attention competition. In contrast, attention to a particular ad element may also spill over to other ad elements. The possibility of such positive and negative attention effects *among* ad elements has been suggested in the advertising literature (e.g., Poffenberger 1925, Wells, Burnett, and Moriarty 2000) but has not yet been examined empirically. Finally, we examine the extent to which the surface size effects of ad elements are homogeneous across three important marketing variables: product involvement, product motivation, and brand familiarity.

To accomplish this, we propose a conceptual model of attention capture and transfer by elements of advertisements

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(AC-TEA), and we estimate its statistical formalization on eye-tracking data for more than 1300 print advertisements and 3600 regular consumers In the next section, we begin to summarize the debate in the advertising literature about the role of the brand, text, and pictorial in capturing consumers' attention to advertising Then, we present the AC-TEA model and hypotheses about the influence of the brand, pictorial, and text elements of print advertising We then describe the methodology, data, and results The findings document the unique effects that the space devoted to the three ad elements has in capturing and transferring attention, and they demonstrate the superiority of each ad element for a specific attention function

The Debate About Brand, Pictorial, and Text Effects

Most print advertisements contain a brand, pictorial, and text element The brand element covers the visual brand-identity cues in print advertisements, such as the brand name, trademark, and logo of the source (Keller 2003) The text element comprises all textual information of the advertisement, excluding all incidences of the brand name The pictorial element comprises all nontextual information of the advertisement, excluding all incidences of the brand trademark and logo There is a long-standing debate in advertising about the attention effects of these three ad elements and their surface size and about the management of the elements to maximize attention capture

Influence of the Brand Element

Some scholars have recommended maximization and others minimization of the brand element's size in advertising Proponents of the first position argue that the brand should be prominently featured in print advertising, as one step in the brand value chain (see Burton and Purvis 1987, Higgins 1986, Kapferer 1992, Keller 2003, Moran 1990) As a case in point, Moriarty (1986, p 291) argues, "the most important thing to remember in national advertising is to focus on identification of the brand It sounds simple, it isn't Play the brand front and center" Likewise, Smith (1973, p 66) recommends to advertisers "In any case, be sure that your product or company name appears clearly and loud" The reasoning is that a prominent brand element, reflected among others in its size, captures more attention to the brand, which is a necessary condition for obtaining the desired brand-communication effects The weight that industry places on the size of the brand element is illustrated by the detailed corporate identity guidelines of firms such as AT&T, J D Edwards, Dow Chemical, and Sun Microsystems For example, AT&T (2003) specifies that its "globe" brand logo should never be reproduced smaller than ⅜ inch and the brand name never smaller than ¼ inch to ensure sufficient attention to them

In contrast, some advertising practitioners claim that brand presence should be curtailed in advertising because the brand element signals that the message is an advertisement in which consumers purportedly are not interested Taking an extreme position, Aitchinson (1999, p 61) argues that the advertisement should be so good that consumers know what the brand is without it being present in the advertisement "Because consumers hate advertising, once they see a page with a logo in the corner, it doesn't look like editorial[,] it doesn't look like the reasons why they bought the magazine in the first place It's a trigger that makes them turn the page faster" The International Newspapers Limited (2003) media company expresses this more moderately as follows "A logo is not a benefit It serves the ego of the client, not the customer It also flags to the reader, Warning this is an advertisement" Such viewpoints may fuel tendencies to minimize brand presence in advertising (Kover 1995)

Influence of Pictorial and Text Elements

The debate about the pictorial and text element centers on which of the two commands the most attention and what the influence of their size is in the process The pictorial illustration is commonly supposed to be the chief element in capturing consumers' attention (Assael, Kofron, and Burgi 1967, Poffenberger 1925, Rossiter 1981, Singh, Lessig, and Kim 2000) For example, Rossiter and Percy (1997, p 295) assert that "the picture is the most important structural element in magazine advertising, for both consumer and business audiences," and they recommend that "the straightforward rule for magazine ads, therefore is the bigger the picture, the better" Likewise, Wells, Burnett, and Moriarty (2000, p 295) affirm that "the bigger the illustration, the higher [is] the attention-getting power of the advertisement" Similar beliefs are held in advertising practice, as is illustrated by Canada's magazine association (Magazines Canada 2001) "A strong visual is perhaps the single most important weapon a magazine has in gaining and capturing reader attention In this case, it appears that picture size does matter Ads using visuals that are ⅔ of a page perform best"

The text element is also believed to be key in capturing consumers' attention For example, Ogilvy (1963, p 104) argues that the headline, the largest text, is the vital part of print advertisements and that "[t]he wickedest of all sins is to run an advertisement without a headline" Belch and Belch (2001, p 290) mention that most advertisers consider the headline the most important ad element

This ongoing debate about the influence of ad elements and their size is further complicated if attention to the ad elements is interdependent Then, attention devoted to a particular ad element promotes attention to or detracts attention from the other ad elements In the first case, there is attention cooperation, in the second case, there is attention competition, which is reflected in positive and negative covariance, respectively, of the attention to the relevant elements Such cases are examples of positive or negative attention transfer

Ideas about attention transfer have been postulated since the early days of magazine advertising Most often, positive attention transfer from the pictorial to the other ad elements is expected For example, Nixon (1924, p 18) believes that pictures in print advertisements may serve to direct attention to the text Others note that attention may be relocated from the pictorial to the brand in advertisements, because the former evokes interest in the latter (Poffenberger 1925, pp

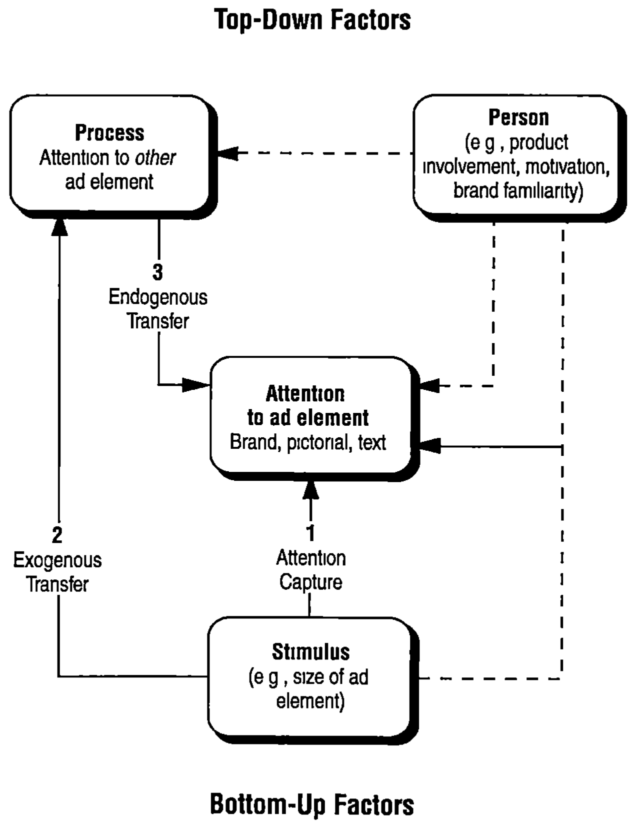
156–61) Such attention transfer has even been formulated as a goal of advertising Wells, Moriarty, and Burnett (2000, p 331) point out that print advertisements try to "guide the eye" over their surface to induce attention carryover

Notably, although there are advocates for each of the ad elements being of key importance to capture and transfer consumers' attention to advertising, these ideas have remained largely untested Rayner and colleagues (2001, p 220) emphasize that "remarkably little is known about the extent to which viewers look at the picture versus the text" of advertisements This study aims to contribute to such knowledge

A Model of Attention Capture and Transfer

Advertisements that capture attention attract consumers so that they select the advertisement from its environment, and they retain consumers so that they pay more attention to the advertisement and its elements than to other advertisements Attention capture enables higher-order cognitive functions to operate on more parsimonious and salient input (LaBerge 1995) This function of attention is central in our AC-TEA model Its background is summarized in Figure 1, and we describe it in the next sections In short, the AC-TEA model describes bottom-up (stimulus) and top-down (person and process) mechanisms of visual attention to advertising It differentiates two forms of attention capture by ad elements, one being independent (baseline) and the other being dependent (incremental) on its size, and it distinguishes two forms of attention transfer from one ad element to the others, one being independent (endogenous) and the other being dependent (exogenous) on its size

FIGURE 1
Determinants of Attention Capture and Transfer to Elements of Print Advertisements



Determinants of Visual Attention to Advertising: Bottom-Up and Top-Down

There are two broad determinants of selective visual attention (indicated in Figure 1) bottom-up factors in the stimulus and top-down factors in the person and in the attentional process itself (Chun and Wolfe 2001, Posner 1980, Theeuwes 1994, Yantis 2000) The attentional processes driven by the bottom-up and top-down determinants reside in distinct but connected areas of the brain (Itti and Koch 2001)

Bottom-up factors are features of advertisements that determine their perceptual salience (Janiszewski 1998), such as size and shape These features capture attention to ad elements rapidly and almost automatically, even when the consumer is not actively searching for them (Wolfe 1998, Yantis and Jonides 1984) Arrows 1 and 2 in Figure 1 represent these effects Top-down factors reside in the person and in his or her attentional process Person factors, such as involvement with products or familiarity with brands (Rayner et al 2001, Rosbergen, Pieters, and Wedel 1997), encourage subjects to voluntarily pay more or less attention to advertisements and their elements The dotted arrows in Figure 1 signify these effects

Part of this study focuses on process effects on visual attention Process-related factors manifest themselves when attention to a particular ad element, regardless of its surface size, is observed to depend on the amount of attention paid to one or more *other* ad elements We conjecture that such dependence is caused by voluntary (top-down) shifts of visual attention Because advertisements are composed of complex scenes and texts, the visual system and knowledge operate jointly to guide attention This occurs because memory and expectations are required to locate and recognize elements with particular visual features in the scene Semantic representations of previously attended elements are stored in memory and provide cues that allow for voluntary redirection of attention based on what was already attended to (Yantis 2000, Yarbus 1967) Arrow 3 in Figure 1 indicates these effects

Attention Capture: Baseline and Incremental

It is useful to distinguish two forms of attention capture, baseline and incremental, as in theories of visual attention in search tasks (Bundesen 1990, Folk, Remington, and Johnston 1992, Logan 1996) and reading (Reichle et al 1998)

Baseline attention is the attention devoted to an ad element, independent of its surface size and other factors, and is at least partially caused by the visual pop-out of the element The higher the baseline attention, the higher is the information-mode priority of consumers for that specific ad element Thus, if consumers in general paid more attention to the pictorial than to the text, independent of the size of these two ad elements, the baseline attention of the former would be higher

Incremental attention is the extra amount of attention that an ad element captures beyond baseline attention because of increases in its surface size The higher the incremental attention, the higher is the surface-size elasticity of attention for that specific ad element Some early work based on observational data found that attention increased with the square root of surface size, which implies an elasticity of 5 (Nixon 1924, Poffenberger 1925)

Attention Transfer: Exogenous and Endogenous

Attention transfer occurs when attention to a particular ad element depends on other ad elements, which can occur through exogenous and endogenous processes (Posner 1980)

Exogenous attention transfer occurs when the surface size of an ad element affects attention to one or more other ad elements This takes place when, for example, an increase in the size of the pictorial element directly increases or decreases attention to the text or brand element (see Arrow 2 in Figure 1) Endogenous attention transfer occurs when attention to an ad element depends on attention to another ad element, independent of their surface sizes Such attention transfer is endogenous, because the attentional process itself provides the cue for redirection of attention instead of it being directly driven by stimulus or person factors Endogenous attention transfer manifests itself when, for example, attention to the pictorial element promotes attention to the text or brand elements in the advertisement, independent of the factors that stimulated attention to the pictorial element in the first place (see Arrow 3 in Figure 1) Not much is known about endogenous attention transfer in complex scenes (Henderson and Hollingworth 1998, 1999) such as advertisements

Hypotheses

What is the influence of ad elements and their size on capturing consumers' attention? We expect that the pictorial captures most baseline attention, independent of its size, and that the text captures most incremental attention because of its size We base these predictions on the reasoning that follows

Scene (picture) perception is genotypically much older than text perception It relies more on peripheral and preattentive processes that are automatic, parallel, fast, and less effortful (Loftus 1983, Ohman, Flykt, and Esteves 2001, Stolk, Boon, and Smulders 1993), and this may have established an attentional priority for it In addition, pictures are often perceptually more distinct than words (Childers and Houston 1984), which draws bottom-up attention We expect that this jointly contributes to a picture superiority effect on baseline attention, independent of the size of the pictorial

Text perception is genotypically more recent It relies more on focal attentive processes, which are voluntary, serial, slow, and effortful (Loftus 1983, Rayner 1998, Reichle et al 1998) Thus, although the gist of a scene can often be comprehended in a few glances (Henderson and Hollingworth 1998, 1999), text requires more eye fixations to be comprehended In addition, text is usually heavily packed in the visual field Thus, more attention per unit surface is required for text than for scene perception, and an increase in the ad size devoted to text further increases its attentional demand We expect that this jointly contributes to a text superiority effect on incremental attention

Specific predictions about effects of the brand-element size on attention would be conjectural given the current lack of knowledge, so we chose to explore these effects We test the following

H_1 Pictorial superiority effect on baseline attention Independent of the surface sizes, more attention is devoted to the pictorial than to the other elements in print advertisements

H_2 Text superiority effect on incremental attention Increases in the surface size of the text element have a greater effect on attention to this element than do increases in the surface size of the other ad elements on attention to them

Which predictions can be made about the transfer of attention between the elements of print advertisements? There is reason to expect substantial competition for attention between ad elements based on their surface size An increase in the surface size of an ad element increases its perceptual salience and its attentional demand, which is likely to detract attention from other ad elements (Janiszewski 1998), because salience is a relative phenomenon (Itti and Koch 2001, Wolfe 1998) Such competition for attention is likely when attentional resources are limited but heavily taxed, such as with advertisements in cluttered magazines Thus, we predict a negative exogenous attention transfer effect (i e , competition for attention between ad elements because of their surface sizes)

Conversely, we predict positive endogenous attention transfer effects (i e , cooperation for attention between ad elements after we control for their surface sizes) To the extent that advertisers succeed in integrating the three ad elements to convey a joint message, attention for one of the ad elements is likely to covary positively with that for other ad elements (Rayner et al 2001) Attention to one element will raise the level of interest in the others, eliciting voluntary redirection of attention, similar to what has been shown in target search tasks (Yantis 2000) At the current level of knowledge, we cannot offer more specific predictions about attention-transfer effects Therefore, we test the following hypotheses

H_3 Negative exogenous attention transfer Increases in the surface size of a particular ad element decrease attention to the other ad elements

H_4 Positive endogenous attention transfer Attention to a particular ad element, independent of its size, is positively associated with attention to other ad elements

Finally, the question is, What is the net effect of ad-element capture and transfer on attention to the advertisement as a whole? That is, will enlargement of the brand size eventually increase or decrease attention to the entire advertisement, and what will the overall effects of the size of the pictorial and text element be? Because of the lack of theory, we abstain from formulating hypotheses, but if advertising practioners' previously reported recommendations hold, larger pictorial sizes should result in a net positive effect on attention to the entire advertisement If the fears of some advertising practitioners are confirmed, larger brand sizes should results in a net negative effect on attention to the entire advertisement The data will reveal whether this is the case

Eye-Tracking Data on Print Advertisements

Tests of Print Advertisements

Verify International, a company that specializes in eye-tracking market research, made available data from 33 independent eye-tracking tests of print advertisements conducted in 1998 Tests were conducted for the present research, to fill the company's database of tested advertisements, and for use in communication to prospective clients On average, 110 randomly selected adult consumers (male/female, ages 18 to 55) from across the Netherlands participated in each test (the sample selection procedure was the same in all tests) Thus, the current data are based on a subject sample of slightly more than 3600 consumers

The 33 tests contained 1363 full-page advertisements (1/1), with an average of 41 advertisements per test Advertisements came from 65 consumer magazines published in the Dutch market, including popular national magazines, such as *Libelle*, *Panorama*, and *Tip Culinair*, and national versions of popular international magazines, such as *Cosmopolitan*, *Elle*, and *Esquire* Magazine page sizes were homogeneous, and there were no nonstandard-sized magazines, such as *Reader's Digest* or *National Geographic* Verify selected the magazines, which covered a wide range of consumer advertisements, brands, and product categories in the Dutch market For each test, advertisements from the most recent issues of the magazines were sampled There were advertisements for 812 national and international brands in 71 product categories, such as airlines, alcoholic and nonalcoholic beverages, cars, cleansing products, clothing, financial products, fragrances, home entertainment, personal care, pet foods, photo equipment, real estate, restaurants, and retail stores

Ad Exposure and Eye Tracking

On entering the market research firm, participants provided sociodemographic information and engaged in a visual exploration task of print advertisements (Janiszewski 1998, Wedel and Pieters 2000), the protocol was the same for each test Participants were instructed as follows "Page through several magazines that are presented on the monitor You can do this at your own pace, as you would do at home or in a waiting room" Next, the advertisements were shown each with the editorial counter page (i e , the page that contains regular magazine content and is opposite an advertising page), preceded by the front cover and trailed by the back cover of the relevant magazine, and in the sequence in which they appeared in the magazines Instructions and stimuli were presented on NEC 21-inch LCD monitors in full-color bitmaps with a 1280 × 1024 pixel resolution Participants continued to the subsequent page by touching the lower right-hand corner of the (touch-sensitive) screen, as when paging After completion, participants engaged in other unrelated studies We believe that the visual exploration task that we used mimics real-life situations closely and allows for maximal bottom-up effects of the ad layout itself

Eye tracking was done by means of infrared corneal reflection methodology (Duchovski 2003, Ober 1994) The cornea is a clear, dome-shaped surface that covers the front of the eye It is the first lens in the eye's optical system In corneal reflection, an infrared light is pointed at the cornea and reflected off it When the eye moves across a spatial stimulus, the difference between the incoming and outgoing angle of the infrared light beam changes After calibration, this is related to the specific position on the stimulus to which the eye moves and at which the fovea in the retina is directed Infrared light is applied because it is "invisible" to the eye and does not distract participants The specific eye-tracking equipment used leaves participants free to move their heads in a virtual box of approximately 30 centimeters Cameras track the position of the eye and head and allow for continuous correction of position shifts Measurement precision of the eye-tracking equipment is better than 5 degree of visual angle The eye-tracking procedure is summarized in Figure 2

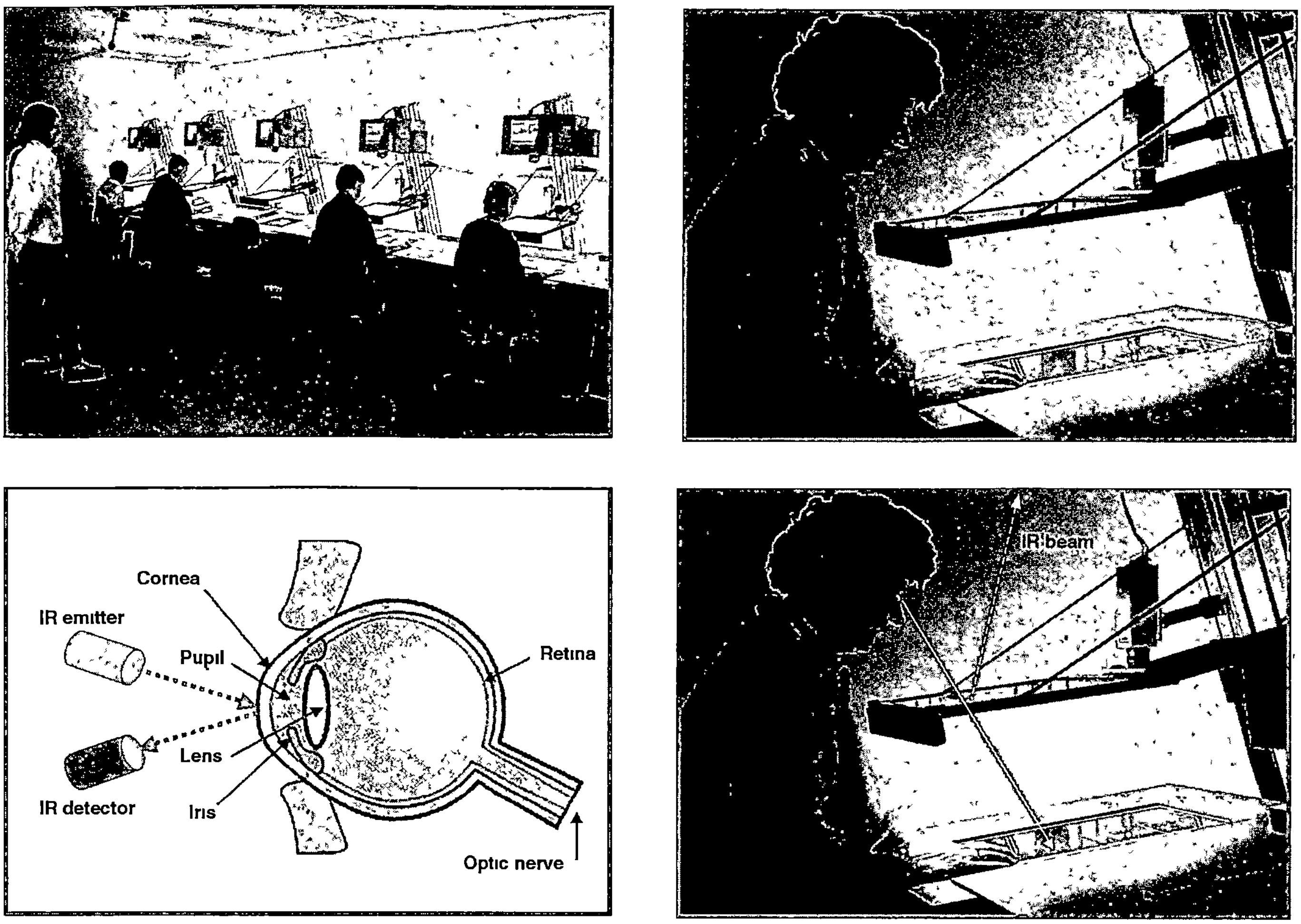
The top-left part of Figure 2 shows the room in which data collection took place, participants at the eye trackers are on the right-hand side, and the operator is on the left-hand side The top-right part of Figure 2 shows a closer view of a participant at an eye tracker The bottom-right part of Figure 2 illustrates how a glass sheet between the participant and monitor reflects the infrared beam from the top (where the light beam comes from) to the eye and back and is transparent for all other light The bottom-left part of Figure 2 illustrates infrared corneal reflection

Three indicators of visual attention employed in previous research (Chandon 2002, Fox et al 1998, Krugman et al 1994, Lohse 1997, Rayner et al 2001, Rosbergen, Pieters, and Wedel 1997) were used ad selection, ad gaze duration, and ad-element gaze duration *Ad selection* is the percentage of participants who fixated on a target advertisement at least once It measures how many consumers an advertisement can attract in its editorial environment *Ad gaze duration* is the total time that consumers who selected the advertisement, on average, spent on it It measures how well an advertisement can retain consumers in its editorial environment *Ad-element gaze duration* measures the time spent on each of the ad elements Because of the demands on data storage and analysis, individual-level fixations could not be retained, so their sequence is unknown, and we analyzed the data as a cross-section

Surface Size of Ad Elements and Covariates

We established surface sizes of ad elements with specialized software by drawing the appropriate boxes and polygons around them, which enabled us to isolate cases of one element being embedded in another (e g , brand logo in a pictorial) We defined ad elements as we described previously Table 1 presents summary information about the surface size of the three ad elements, the entire advertisement, and attention to them

FIGURE 2
The Eye-Tracking Procedure



We added the following (stimulus and person) covariates as control variables: overall ad size, serial position of test advertisements, magazine type in which the advertisements were placed, product involvement and motivation, and brand familiarity. We assessed the variables in a content analysis of the 1363 advertisements and 65 magazines. We included overall ad size because of its influence on attention to advertising (e.g., Lohse 1997). Although all the advertisements are full-page, their surface sizes vary because of differences in magazine formats and the use of bleed or trim. The addition of overall ad size as a covariate ensures proper estimation of the effects of ad-element surface sizes across advertisements. We included information about the serial-position of advertisements (from 1 to n: first to last) in the 33 tests, because advertisements seen earlier on typically capture more attention than later ones (Lohse 1997). Magazine type may influence visual attention to advertising through technical reproduction quality and editorial context, particularly glossy magazines, which provide significantly better reproduction quality. To control for this potential effect, two judges categorized each of the 65 magazines into leisure/glossy versus other magazines (92% agreement). Of the advertisements, 62% appeared in leisure/glossy magazines (n = 843), such as *Cosmopolitan* and *Elle*, and 38% (n = 520) appeared in other magazines, such as *Margriet* and *Top Sante*.

In addition, we included product involvement, motivation, and brand familiarity because of prior evidence that these factors may influence attention to print advertising (Hanssens and Weitz 1980; Pratkanis and Greenwald 1993; Ratchford 1987; Rayner et al. 2001; Rosbergen, Pieters, and Wedel 1997; Vaughn 1980). An independent sample of ten trained judges categorized product involvement and brand familiarity of the advertised products and brands, and another independent sample of ten trained judges (MBA students, five males and five females, in both cases) categorized product motivation to minimize possible learning across tasks. To assess product involvement, judges individually sorted the advertised products (names typed on cards) into two categories: (1) involved, an important decision ("I'm very motivated when I buy a product from this category, a decision about this is [very] important") and (0) uninvolved, not an important decision ("I'm not [at all] motivated when I buy a product from this category, a decision about this is [very] unimportant"). Cronbach's alpha across the ten judges was .916, and each product was

TABLE 1
Summary Information of Surface Sizes and Attention

Variables	Mean	S D	Minimum	Maximum
Surface Size (dm^2)				
Advertisement	4 72	177	4 14	5 43
Brand	53	384	05	3 53
Pictorial	2 74	1 279	04	5 02
Text	1 33	863	03	4 27
Attention				
Selection (percentage)	95 70	4 78	61	100
Duration (gaze in 1 seconds)				
Advertisement	17 26	5 68	3 71	52 96
Brand	4 31	1 80	84	14 03
Pictorial	5 75	2 80	05	22 85
Text	7 21	4 88	05	30 50
Tests (n)	33			
Advertisements (n)	1363			

Notes Selection is the percentage of participants in a test who fixated at least once on an advertisement We calculated duration across participants who selected an advertisement

assigned its modal involvement Of the advertisements, 46% were for low-involvement products (n = 624), and 54% were for high-involvement products (n = 739)

To assess product motivation, judges individually sorted the advertised products (names typed on cards) into the following two categories (1) think, functional ("I buy this product because it solves or prevents a problem and/or because I need it") and (2) feel, hedonic ("I buy this product because it makes me feel good and/or because it helps my personal growth") Cronbach's alpha across the ten judges was 866, and each product was assigned the modal motivation category Of the advertisements, 47% were for think products (n = 643), and 53% were for feel products (n = 720)

To assess brand familiarity, judges sorted the advertised brands (names typed on cards) in the following three categories (1) "unknown brand, I do not know this brand name," (2) "known brand, I know this brand name, but know little more," and (3) "well-known brand, this brand is familiar to me, I know more than just the brand name" Cronbach's alpha across the ten judges was 951, and the modal brand familiarity was assigned to each brand name Of the advertisements, 30% were for unknown brands (n = 407), 25% were for known brands (n = 347), and 45% were for well-known brands (n = 609)

Model Formulation

The AC-TEA model can be expressed as a multilevel multivariate regression model (Goldstein 1995, Zellner 1972) We begin by describing ad-element gazes Suppose that $i = 1, \ldots, I$ indicates the 1363 advertisements, $j = 1, \ldots, J$ (and $k = 1, \ldots, K$) indicates the three ad elements, and $t = 1, \ldots, T$ indicates the 33 tests The vector $q_{i,t} = [q_{i,t,j}]$ denotes gaze duration on the J elements of advertisement i in test t, and the vector $s_{i,t} = [s_{i,t,j}]$ denotes the surface sizes of the J elements of advertisement i in test t In addition, we have a vector, $x_{i,t} = [x_{i,t}]$, of covariates

$$(1)\quad \underbrace{\ln(q_{i,t})}_{\substack{\text{Gaze}\\ \text{duration}}} = \underbrace{\mu}_{\substack{\text{Baseline}\\ \text{attention}\\ \text{information}\\ \text{mode}\\ \text{priority}}} + \underbrace{\Gamma \ln(s_{i,t})}_{\substack{\text{Incremental}\\ \text{attention}\\ \text{surface size}\\ \text{elasticities}}} + \underbrace{A \ln(q_{i,t,-j})}_{\substack{\text{Endogenous}\\ \text{attention}}}$$

$$+ \underbrace{B x_{i,t}}_{\substack{\text{Covariates}\\ \text{stimulus and}\\ \text{person factors}}} + \underbrace{E \ln(s_{i,t}) x_{i,t}}_{\substack{\text{Heterogeneity}\\ \text{of incremental}\\ \text{attention}}} + \underbrace{\phi_t}_{\substack{\text{Test-level}\\ \text{variability}}} + \underbrace{\omega_{i,t}}_{\substack{\text{Residual}\\ \text{variability}}}$$

The model has a double log specification to accommodate the nonnegativity and right skewness of gaze durations and ad-element sizes The log–log formulation accounts for nonlinear and multiplicative effects, which is desirable (Bundesen 1990, Reichle et al 1998), and it renders interpretation easier, because coefficients are scale free and can be interpreted as elasticities (i e , percentage change in attention for a 1% change in a variable)

Baseline attention effects are represented by $\mu = [\mu_j]$, a vector of ad element–specific constants Incremental attention effects due to the size of the ad elements are represented by the diagonal of $\Gamma = [\gamma_{j,k}]$, a matrix of ad element–specific coefficients This diagonal taps the influence of the surface size of ad-element j on attention to element j itself Arrow 1 in Figure 1 indicates this Exogenous attention transfer is represented by the off-diagonal part of Γ It taps the influence of the surface size of ad-element j on attention to other ad elements $k \neq j$ Arrow 2 in Figure 1 indicates these effects Endogenous attention transfer is represented by the matrix $A = [\alpha_{j,k}]$ Because Equation 1 controls for all other effects, Matrix A represents influences that are endogenous to the attentional process itself The vector $[q_{r,i,t,-j}]$ contains $J - 1$ elements, but the jth element itself is missing because attention to element j cannot affect itself Arrow 3 in Figure 1 indicates these effects Attention-transfer effects can be asymmetrical (e g , attention to the pictorial and text may transfer [endogenously or exogenously] more to the brand than the other way around)

Matrices B and E in Equation 1 represent the effects of covariates on attention to the ad elements. The covariate vector $x_{r,i,t} = [x_{r,i,t,p}]$ contains stimulus and person factors that may directly influence attention to the ad elements. Matrix E represents the influence on attention that product involvement, motivation, and brand familiarity have in interaction with ad-element sizes. Dotted arrows in Figure 1 represent the effects of these covariates. We specify two $(J \times J)$ vectors of random effects to assess differences between tests and between advertisements within tests, with $\phi_t \sim N(0, V_\phi)$, and $\omega_{it} \sim N(0, V_\omega)$, where V_ϕ and V_ω are $(J \times J)$ diagonal matrices to be estimated.

To examine the effect of ad-element sizes on attention capture to the entire advertisement, we estimated the model in Equation 1 simultaneously for the ad selection and ad gaze duration measures (i.e., $j = 1,2$ indicates these two measures in this case). This reduced version of the AC-TEA model does not include endogenous attention transfer effects (i.e., $A = 0$). We used a logit specification of ad selection to accommodate this measure being a proportion and to facilitate comparison with the log gaze durations.

Model Estimation and Evaluation

Because the model is a multivariate multilevel regression model, we employed Markov chain Monte Carlo methods to estimate it, which facilitates the evaluation of the multiple integrals occurring in the likelihood function (Gelman et al. 1995). In each Markov chain Monte Carlo iteration, we draw from the full conditional distribution of parameters, conditional on the values of the other parameters obtained from the last draw. All prior distributions are standard noninformative distributions, for a fixed generic parameter θ, $p(\theta) \propto 1$, and for a generic scalar variance σ^2, $p(1/\sigma^2) \sim$ gamma(.001, .001). We use 10,000 draws, with a burn-in of 2000, and we retain every target draw. We start the algorithm from iterative generalized least squares estimates and monitor convergence through plots of key parameters against iterations, which indicate convergence well before the end of the burn-in. We present the posterior mean and posterior standard deviation (S.D.) of coefficients. A parameter is considered significant if the posterior mean is at least twice as great as the posterior S.D. To assess incremental model fit, we use the deviance, deviance information criterion (DIC, Spiegelhalter et al. 2002), and pseudo R^2 statistics.

Results

Table 1 presents descriptive statistics of the ad elements and visual attention. The pictorial is the largest ad element (2.74 dm^2 = 42.47 $inch^2$), followed by the text (1.33 dm^2 = 20.62 $inch^2$) and the brand (.53 dm^2 = 8.22 $inch^2$). On average, advertisements were selected by 95.7% of the participants (who fixated at least once), and the lowest-scoring advertisement was skipped by 39% of the participants. Participants who selected the advertisements, on average, attended 1.73 seconds to the advertisement as a whole (text .7 seconds, pictorial .6 seconds, and brand .4 seconds), which is typical when consumers explore regular magazines at their own pace (e.g., Rosbergen, Pieters, and Wedel 1997) but lower than when advertisements are tested in laboratory conditions (e.g., Fox et al. 1998).[1]

Attention to the Entire Advertisement

We examine what the net effect of brand, pictorial, and text size is on attention to the entire advertisement. Table 2 presents the results of the analysis. For parsimony, we omit the interactive effects of the covariates with size, because none of these was significant and the overall fit of the model with all effects did not improve (deviance = 1683, DIC = 1778).

Neither the surface size of the brand nor the pictorial affects attention to the entire advertisement for attention selection and duration. However, a 1% increase in the text surface size increases attention significantly. Selection improves by .05% (coefficient = .048) and duration by approximately .16% (coefficient = .156). In particular, the text-size effect on duration of attention to the advertisement is noteworthy; it accounts for approximately 17% of the variation. The patterns of the results for attention selection and duration are similar, indicating that during visual exploration, bottom-up factors that influence attention selection also influence attention duration.

The observed positive text surface-size effect is not caused by differences in the overall size of advertisements from different magazines or by (unobserved) features of the magazines in which the advertisements were placed. In a follow-up analysis, we added dummy variables to the model, representing each of the magazines that contributed 20 or more advertisements to the sample. Estimates of the surface-size effects remained virtually unchanged. The brand and pictorial surface-size effects were insignificant, and the text surface-size effect was positive and significant. Several covariates influence attention to the entire advertisement systematically, notably serial position (advertisements that are placed later in the page sequence are less attended), product involvement (advertisements for high-involvement products are more attended), and brand familiarity (advertisements for familiar brands are less attended).

Thus, an increase in the size of the pictorial does not increase attention to the entire advertisement, but an increase in the surface size devoted to the text does. We obtained these effects while controlling for relevant stimulus and person factors that could potentially bias the findings. Next, we examine how these net effects on attention to the entire advertisement came about from attention to the three ad elements, and we test the hypotheses.

Attention to the Elements of Advertisements

We estimated the AC-TEA model in Equation 1 for gaze duration to the three ad elements. The overall fit of this model is R^2 = 32.2%, accounting for considerable portions of variance in attention to the brand (46.4%), pictorial (15.3%), and particularly the text (69.8%) in advertisements.

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[1] Average gaze duration on editorial pages was 2.79 seconds, which is significantly higher than on the advertisements.

TABLE 2
Attention to Print Advertisements: Size Effects

	Advertisement Attention			
	Selection		Duration	
Parameter	**Coefficient**	**S.D.**	**Coefficient**	**S D.**
Constant	– 786	575	**1.671**	350
Covariates				
Ad size (log dm^2)	**2 086**	374	**.808**	227
Ad serial position first to last (1 – x)	**– 003**	001	**–.003**	000
Magazine type leisure/glossy–other (1 – 0)	– 021	033	– 029	020
Product involvement high–low (1 – 0)	**.117**	027	**.071**	016
Product motivation think–feel (1 – 0)	– 033	027	005	015
Brand familiarity high–low (2 – 0)	**– 030**	014	**–.029**	009
Size Effects of Ad Elements				
Brand (log dm^2)	001	019	– 011	011
Pictorial (log dm^2)	021	020	– 008	012
Text (log dm^2)	**.048**	017	**.156**	010
Variance at test level	021	007	022	006
Variance at ad level	188	007	063	002
Deviance	1682			
DIC	1759			
Pseudo R^2	22 2%			

Notes Selection = logit (proportion of participants fixating at least once on an advertisement) Duration = log (average time spent on advertisement, if fixated) We report posterior mean coefficients and standard deviations Posterior means twice as great as the posterior standard deviations are boldface, the 95% credible interval of boldface coefficients does not cover zero

Attention capture baseline and incremental In support of H_1, a notable pictorial superiority effect on baseline attention emerges Table 3 reveals that the constant for pictorial attention is high and significant (coefficient = 3 395) and that the constants for brand attention and text attention both are small and insignificant This indicates that the pictorial has an intrinsic tendency to capture a substantial amount of attention, independent of its surface size and of all other factors in the model, whereas the other two ad elements lack this tendency

In support of H_2, a strong text superiority effect on incremental attention is evident The mean surface-size elasticity for the text element is 85, which is more than two times greater than the mean coefficients for the brand (32) and pictorial surface-size effects (32) Thus, a 1% increase in the surface size of the text leads to a 85% increase in gaze duration, which is substantial The text size effect is significantly larger than the brand and pictorial size effects

Table 3 also demonstrates the extent to which the effects of the surface-size element are stable across product involvement, product motivation, and brand familiarity In particular, the surface size of the text element interacts with the three covariates, that is, advertisements for high-involvement products gain more from increasing the surface size of their text element than do advertisements for low-involvement products Advertisements for think products gain less from increasing the surface size of their text element Finally, at smaller surface sizes, advertisements for well-known brands capture more text attention that do advertisements for unknown brands, though the effect is fairly small [2]

The findings support our hypotheses that the pictorial in advertisements captures superior baseline attention independent of its size and that the text in advertisements captures superior incremental attention because of its size, when we control for the effects of relevant covariates

Attention transfer exogenous and endogenous In support of H_3, the effects of an ad element's surface size on attention to *other* ad elements all have a negative sign, and three of them are significant (in Table 3, under "Size Effects of Ad Elements") The most notable case of this exogenous attention competition between ad elements due to their surface size occurs for the brand and text An increase in the surface size of the brand (by 1%) detracts a large amount of attention from the text (41%), and an increase in the surface size of the text (by 1%) detracts attention from the brand element (23%) Finally, an increase in the pictorial surface size (by 1%) withdraws attention from the brand (11%)

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[2] The observed superiority effect of text surface size on incremental attention is not due to these interaction effects In a model without the interaction effects, the coefficient of text surface size was 927 (S D = 022), which again was more than two times greater than the effects of brand (376, S D = 013) and pictorial (411, S D = 038) surface size on attention to those ad elements

TABLE 3
Attention to the Brand, Pictorial, and Text of Print Advertisements: Size Effects

	Brand Attention		Pictorial Attention		Text Attention	
Parameter	**Coefficient**	**S.D.**	**Coefficient**	**S.D**	**Coefficient**	**S.D.**
Constant	– 014	392	**3.395**	1 030	687	669
Covariates						
Total ad size (log dm²)	**1.060**	253	**–1 542**	676	031	435
Ad serial position first to last (1 – x)	**–.003**	000	– 001	001	**–.003**	001
Magazine type leisure/glossy–other (1 – 0)	**–.054**	022	103	058	026	038
Product involvement high–low (1 – 0)	019	028	– 039	077	002	031
Product motivation think–feel (1 – 0)	**.057**	027	– 125	075	**.059**	032
Brand familiarity high–low (2 – 0)	**–.045**	013	– 032	038	**039**	017
Size Effects of Ad Elements						
Brand (log dm²)	**322**	026	– 061	046	**–.409**	026
Pictorial (log dm²)	**–.111**	014	**.315**	080	– 028	025
Text (log dm²)	**–.230**	017	– 087	051	**.852**	044
Heterogeneity of Size Effects						
Ad element$_j$ × product involvement	– 018	024	070	067	**273**	039
Ad element$_j$ × product motivation	046	024	071	068	**– 205**	040
Ad element$_j$ × brand familiarity	**.050**	023	032	066	**–.131**	034
Endogenous Transfer						
Brand attention (log 1 second)	—	—	**217**	075	**512**	047
Pictorial attention (log 1 second)	**.026**	010	—	—	– 012	017
Text attention (log 1 second)	**159**	015	– 027	042	—	—
Variance at test level	014	004	026	012	012	005
Variance at ad level	084	003	629	024	258	010
Deviance	5712					
DIC	5828					
Pseudo R²	32 2%					

Notes We report posterior mean coefficients and standard deviations Posterior means twice as great as the posterior standard deviations are boldface, coefficients for surface-size effects are boldface and underlined, the 95% credible interval of boldface coefficients does not cover zero

Figure 3 summarizes the surface-size effects For each ad element, the estimated effect of an increase in its surface size on attention to itself and to the other ad elements is shown for when all other variables are held constant (estimated attention on the y-axis, observed surface sizes of the elements on the x-axis) Figure 3 illustrates the strong incremental attention effect of text surface size and the attention competition between brand and text surface size

H_4 predicts positive endogenous attention transfer between the three ad elements, when we account for attention effects due to the surface sizes In support of this, four of the six effects are positive and substantial, the other two are not different from zero Notably, brand attention plays a major role That is, increased attention to the brand (1%) is associated with more attention to the pictorial (22%) and to the text (51%) Although increased attention to the pictorial or text in advertisements (1%) is associated with more attention to the brand (03% and 16%, respectively), the latter effects are quite small, they are smaller than the positive attention-transfer effects of the brand

These findings suggest the presence of an unexpected brand-superiority effect in endogenous attention transfer They suggest that when attention has been drawn to the brand, the attention is linked more strongly to the pictorial and text elements than it is when it has been drawn to the pictorial and text elements

Figure 4 summarizes the influence that ad elements have in endogenous transfer of attention and illustrates the potential superiority effect for the brand A cautionary note on the interpretation of these effects is important Because we used cross-sectional data and no sequential information is available, strictly speaking we cannot draw conclusions on causality, we can only conclude that attention to ad elements covaries However, note that the endogenous transfer effects are unlikely to be caused, for example, by a mere total attention effect If overall attention to the advertisement were to confound the effects of attention paid to a particular element, it would bias all attention transfer effects homogeneously However, correcting for ad-element surface sizes, we find quite different effects across the elements

Benchmark model comparisons To gain more insight into the relative magnitudes of the attention effects under study, we estimated a sequence of benchmark models Table 4 gives the analysis of deviance as well as the DIC and pseudo R² statistics of the models First, we estimated the

FIGURE 3
Surface-Size Effects of Brand, Pictorial, and Text on Attention: Capture and Exogenous Transfer

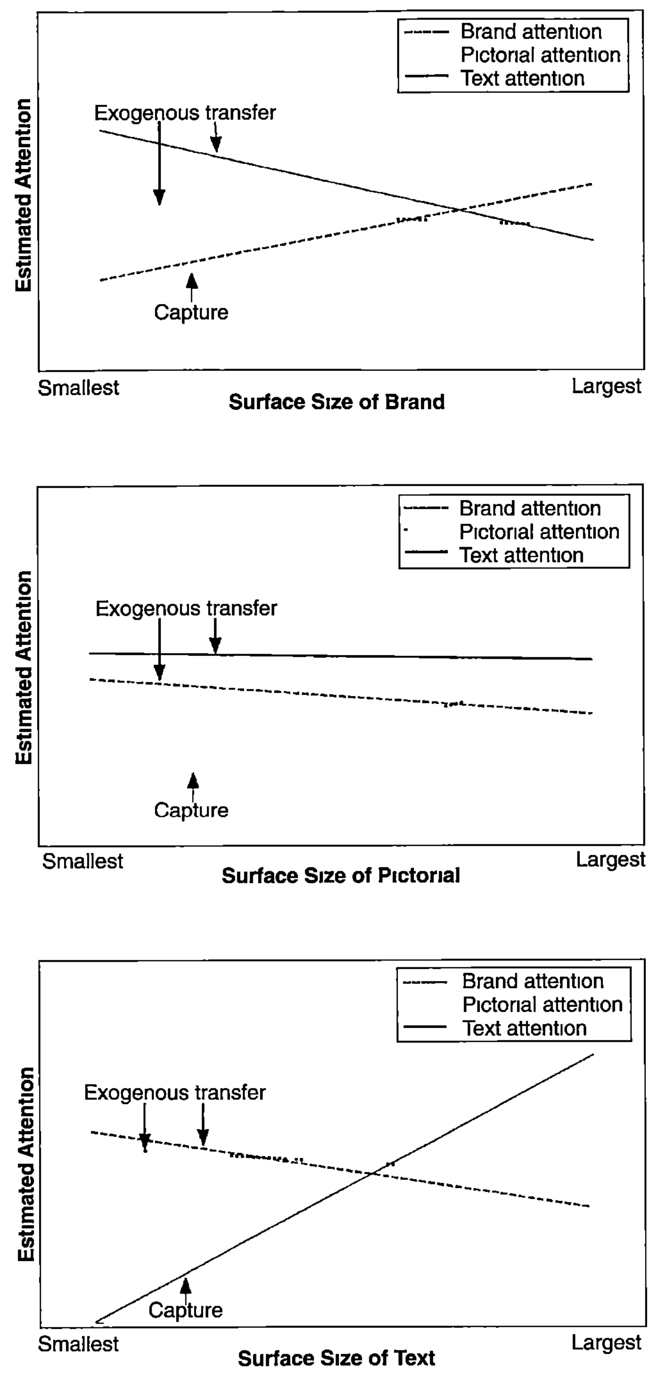
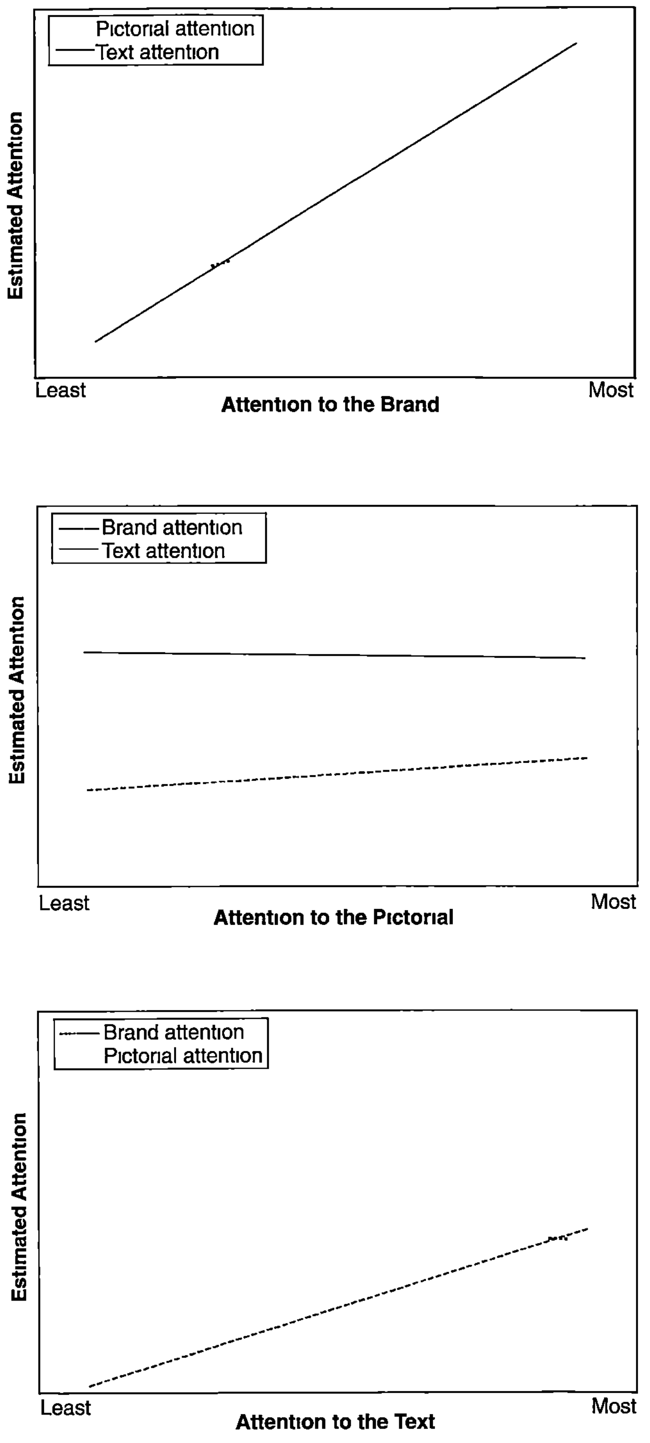


FIGURE 4
Effects of Attention to Brand, Pictorial, and Text on Attention to the Other Ad Elements: Endogenous Transfer



null model (Model 0), which contained constants only. Second, we added the following effects at each subsequent stage: covariate effects on attention (Model 1), attention capture (own effects of element surface sizes, Model 2), exogenous attention transfer (cross-effects of element sizes, Model 3), interaction effects of element sizes with covariates (Model 4), and endogenous transfer effects (Model 5). A comparison of this sequence of models reveals the notable finding that the three attention-capture effects present 21.5% of the total attention process, whereas exogenous and endogenous transfer jointly account for only 6.4%. This finding points to the importance of bottom-up processes in visual exploration of print advertisements.

TABLE 4
Analysis of Deviation and Model Comparisons

Model	Predictors	Deviance	DIC	R^2
0	Constant	8425	8507	—
1	+Covariates	8063	8161	4 3
2	+Size effects capture	6253	6355	25 8
3	+Size effects exogenous transfer	6020	6128	28 5
4	+Heterogeneity of size effects	5915	6032	29 8
5	+Endogenous transfer	5712	5828	32 2

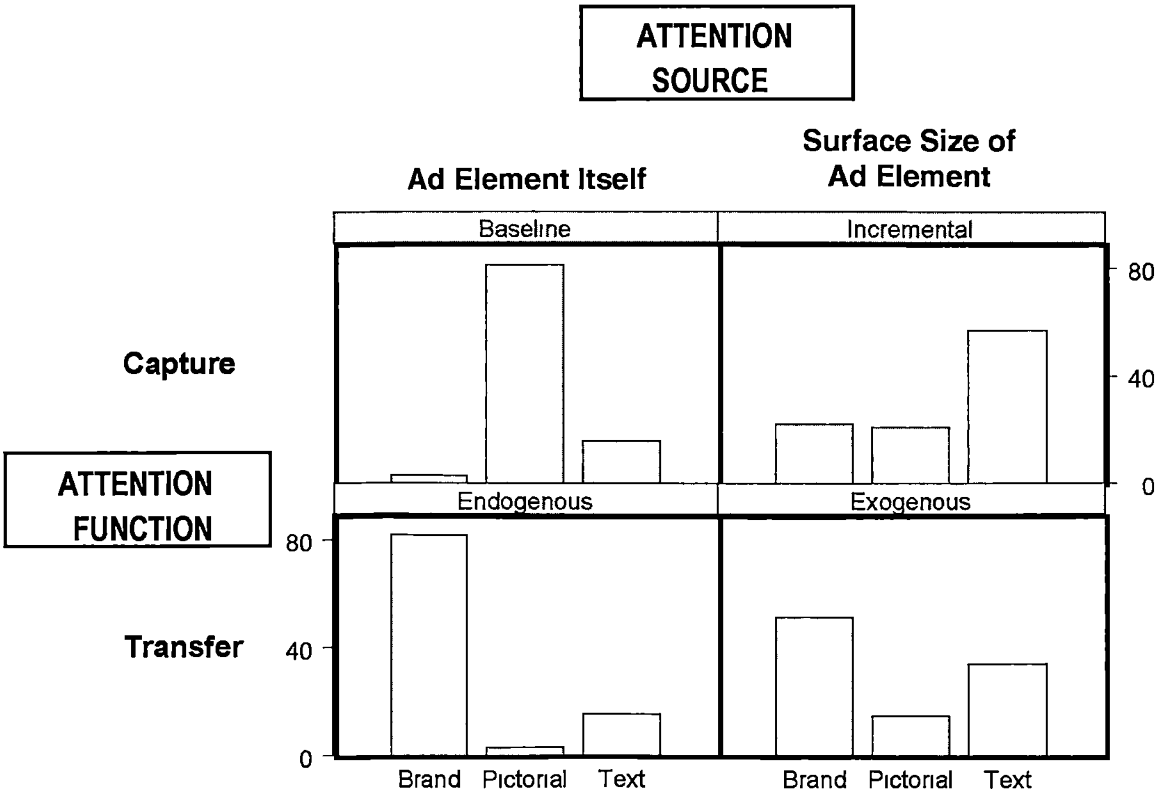
Discussion and Implications

The brand, pictorial, and text elements of print advertisements have significant effects on attention capture and transfer that are on par with common ideas in advertising practice and literature Figure 5 summarizes the relative magnitudes of effects by combining the attention source (ad element versus surface size) and attention function (capture versus transfer), which we believe has important implications for advertising management and for theory

Managerial Implications

The surface size of the pictorial element has no demonstrable effect on attention to print advertisements as a whole Moreover, it has only a small effect on attention to the pictorial itself However, the pictorial draws significant amounts of baseline attention during ad exploration, regardless of its size This picture superiority in baseline attention is important in view of recommendations such as "make the illustration relatively large" (Armstrong 2000, p 6), make it at least larger than half the size of the advertisement (Assael, Kofron, and Burgi 1967), make it two-thirds of the advertisement, or "the bigger the picture, the better" (Rossiter and Percy 1997, p 295) On the basis of the current findings, advertisers and agencies would be ill advised to maximize the surface size of the pictorial, regardless of its content, in an effort to maximize attention to the entire advertisement

FIGURE 5
Relative Magnitudes (%) of Brand, Pictorial, and Text Superiority Effects on Attention to Print Advertisements



However, there is evidence for text superiority in incremental attention, with the surface size devoted to the text having a substantial positive effect on attention to the entire advertisement This is because an increase in text surface size raises attention to this element much more than it simultaneously reduces attention to the brand and pictorial elements We obtained these results while controlling for product involvement and motivation, brand familiarity, media context, and other possible confounders, which points to their generality From our study, we cannot conclude the extent to which the surface-size effect is caused by text layout (e g , increases in font type or size, such as in the headline), text amount (e g , number of words), or increases in the amount of information provided by it However, in view of our findings and the large amount of variability explained in attention to the text element (70%) by the surface size alone across the large sample of advertisements, advertisers aiming to maximize attention to the entire advertisement should seriously consider devoting more space to text Follow-up research is needed to examine the effects of increased text attention on downstream communication effects such as brand awareness and attitude

Increases in the surface size of the brand element do not have a net negative effect on attention to the entire advertisement This finding should relieve advertisers and agencies that fear that a prominent brand would trigger consumers to turn the page faster Increases in an advertisement's surface size promote more attention to the brand element, but this is offset to some extent by reduced attention to the text Thus, strong branding practices that involve more prominent placement of the brand's visual identity symbols in print advertisements favor rather than harm attention to the brand, in addition, they have only small negative effects on attention to the other ad elements and no negative net effect Attention to the brand and pictorial increases with an increase in surface size at the same rate, that is, with somewhat less (surface^{32}) than the square root of the surface size, as has been suggested (Nixon 1924, Poffenberger 1925)

Unexpectedly, we find sizable brand superiority in endogenous attention transfer That is, our results suggest that attention captured by the brand element transfers more readily to the pictorial and text than to the brand This has not been previously described and runs counter to common beliefs in advertising practice Instead of attention carrying over easily from the pictorial, attention captured by the brand appears to play a key role in routing attention through advertisements Although the net effect of (exogenous and endogenous) attention transfer is small compared with attention capture, and we should be cautious in interpreting the effects as causal, the findings point to a possible crucial role of the brand in the integration of the information contained in the advertisement Advertisements that succeed in capturing attention to their source (i e , the brand) may thus also succeed in relocating attention to the message of the advertisements, as contained in the pictorial and text elements, the size of the brand element helps achieve this, as our results indicate

We showed that brand familiarity reduces attention to the brand element but simultaneously increases attention to the text element, rather than having a global attention reduction effect across all ad elements Because the decrease in brand attention surpassed the increase in text attention, the net effect on attention to the entire advertisement was a reduction Advertisements for well-known brands may invite consumers to inspect the text more, which presumably contains further information about the brand Even for small surface sizes, we observed the text-pull effect by brand familiarity This suggests that particularly familiar brands gain attention from increasing the text surface in their advertisements, which may also be desirable in view of the demonstrated text–brand attention transfer effects Although it becomes more difficult to attract consumers' attention in clustered advertising media, the good news from this study is that advertisements' bottom-up influences account for more than three times the variance than top-down influences, which may inhibit the intrinsic attention-capture effects caused by advertising design with respect to its elements

Limitations and Directions for Further Research

Limitations of this study offer opportunities for further research First, this research has focused on how the attention of consumers is captured and transferred by elements of print advertisements, leaving the following question unanswered How much attention is required for communication effects such as brand awareness and attitude? There is increasing evidence that even small attentional effects of advertisements and other commercial stimuli, such as catalogs and packaging designs, can have substantial effects on brand memory, attitudes, and sales (e g , Chandon 2002, Janiszewski 1998, Pieters and Warlop 1999, Wedel and Pieters 2000), but further research into the link between attention and its downstream effects is desirable

A second limitation is that our data were cross-sectional The danger of inferring causality from cross-sectional data is well known, and our approach is no exception Although the time order is of no concern for attention capture or exogenous transfer, endogeneity caused by ad content may hinder causal interpretations of endogenous transfer effects [3] We have attempted to include as controls the effects of several important covariates related to the content and context of the advertisements Currently, we have no indication that this potential biasing effect of other content-related variables is present and systematic across the large number of advertisements under study We investigated the effect of the size variables across a large representative sample of advertisements and consumers, accounting for random differences between the advertisements The revealed effects were motivated from prior theory in visual perception, which provides additional support for a causal interpretation Still, only moment-to-moment analyses of attention scanpaths and detailed content analyses of advertisements can provide more definite answers

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[3] We thank David Schmittlein and an anonymous reviewer for pointing this out

Conclusion

Advertising-attention research has come a long way since Nixon (1924) hid behind a curtain and painstakingly observed eye movements of consumers who were paging through a magazine with print advertisements Eye-movement data of large samples of consumers attending to large samples of advertisements gathered using infrared eye tracking are currently being produced on an industrial scale and used by companies to optimize decisions on the design of advertisements, packages, Web pages, and other carriers of their visual brand-equity symbols The application of theories and models of visual attention, such as the AC-TEA model presented in this study, is likely to render such research and the decisions based on it more effective The availability of direct measures and detailed models of attention enables tests of long-standing beliefs in the advertising industry and substantial improvements in the validity of findings and recommendations The first and foremost finding derived from this study is that size clearly matters in capturing attention to advertising, but it matters in ways that are quite different from what was commonly assumed

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The Roles of Channel-Category Associations and Geodemographics in Channel Patronage

Consumers purchase goods from various channels or retail formats, such as grocery stores, drugstores, mass merchandisers, club stores, and convenience stores To identify the most appropriate channels and to allocate the distribution of products among channels efficiently, managers need a better understanding of consumer behavior with respect to these channels The authors examine the moderating role of channel-category associations in consumer channel patronage by extending the literature on brand associations to the context of channels, and they estimate a model that links channel-category associations with consumer geodemographics and channel share of volume The authors first identify the product categories associated with particular channels through a correspondence analysis of a field-intercept survey They then use the channel-category associations and geodemographic factors to estimate their direct and interactive effects on channel share of volume The channel-category associations have significant main effects and interaction effects with channel type and geodemographic factors on channel share of volume, and they account for the majority of the explained variance (72%) in channel share of volume Overall, the findings provide several conceptual and managerial insights into consumer channel perceptions and patronage behavior

Consumer goods are typically available through several channels or retail formats For example, consumers can purchase dishwashing liquids from grocery stores, mass merchandisers, club stores, and drugstores Because consumers can select channels on the basis of factors such as price, convenience, assortment, and service, channels must position themselves and undertake initiatives that enable them to compete with one another successfully (Webster 2000) For example, evidence that mass merchandisers are gaining ground at the expense of other channels (e g , Levy 2000) has led to initiatives such as efficient consumer response by grocery stores (Kahn and McAlister 1997) Determinants of brand choice, such as promotion (e g , Guadagni and Little 1983), consideration sets (Roberts and Lattin 1991), variety seeking (e g , Inman 2001, Kahn and Raju 1991), and drivers of store choice (Kumar and Leone 1988, Solgaard and Hansen 2003), have been extensively studied However, little is known about choice behavior at the highest level in the purchase decision tree the selection of the channel

In this research, we explore the influence of two factors that are relevant to channel patronage decisions geodemographics and associations between the channel and particular product categories *Geodemographics* is the classification of people by the neighborhood in which they live, combined with demographic variables, to form an overall consumer profile (Johnson 1989) It is based on the notion of social clustering, that is, people tend to congregate with people like themselves according to the same factors that determine consumption social rank, household composition, ethnicity, urbanicity, and mobility (Goss 1995) Geodemographic targeting is a two-step process Households or block groups (depending on data availability) are combined into similar groups by means of cluster analysis of various geographic and demographic factors, and then similarities in purchasing behavior (i e , based on panel data or customer databases) are examined to identify the most viable targets for the product or service in question [1] If consumption of the focal product or service skews toward certain geodemographic groups, a "geotargeting" strategy can be cost effective A market research subindustry has developed around geodemographic targeting (e g , Curry 1993), including firms such as VNU (PRIZM, Spectra) and National Decision Systems (MicroVision)

Although the notion of channel associations offers conceptual appeal, it has received little attention from researchers Several scholars have argued that brand associations in memory are a central component in brand evaluation and choice (e g , Keller 1993, van Osselaer and Janiszewski 2001) *Brand associations* are defined as the "informational nodes linked to the brand node in memory and contain[ing] the meaning of the brand for consumers" (Keller 1993, p 3) Research reveals that brand associations influence persuasion (Greenwald and Leavitt 1984), evaluations (Broniarczyk and Alba 1994, Janiszewski and van

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[1] In some cases, such as trade area analysis, the analysis focuses on profiling heterogeneity in geodemographics across trade areas (e g , Faulds and Gohmann 2001) Our focus is on the variation in consumption across geodemographic groups

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Osselaer 2000), and usage intentions (Lane 2000) Similarly, channel-category associations can be viewed as consumer perceptions from the perspectives of both channel and category, that is, a given channel can be strongly associated with some product categories Likewise, a given product category may be more closely associated with one channel than with others Conceptually, the association of a given channel with a given category can be viewed as a measure of consumer perceptual similarity between the specific channel and the specific category

Our goal is to identify the categories of consumer goods that are most closely associated with particular channels (i e , mass merchandisers, grocery stores, club stores, and drugstores) and to examine the interplay between the channel-category associations and geodemographics in the explanation of variation in channel share of volume across product categories Our study aims to provide a descriptive behavior of channel patronage that will facilitate the development of a theory of channel purchasing behavior An understanding of these phenomena is key to addressing several managerially important questions that arise in a multichannel environment More specifically, we address three key questions in this research

Research Question 1 is, What types of product categories are associated with a given channel? That is, what signature product categories tend to come to mind when consumers think of that channel? If the basket of goods drives channel selection (e g , "if we need detergent, soaps, and other cleaning items, we go to a mass merchandiser"), an understanding of the products most closely associated with particular channels becomes key to the development of relationship-marketing programs with retailers Brand associations with product features and benefits are a central component of Keller's (1993) brand-equity framework, because product aspects that are strongly associated with certain brands represent points of differentiation between brands (e g , Dillon et al 2001) Similarly, retailers need to know if they are well positioned on the factors that differentiate between channels and thus serve as the important drivers of channel patronage decisions

Research Question 2 is, What channel-category associations and geodemographic clienteles influence channel share of volume? Conceptually, stronger associations between a category and specific channels should lead to an increased share of volume for those channels In terms of practice, the answer to this question can guide retailers in determining their store layout and merchandising strategies Category consumption typically varies widely across geodemographic groups, thus forming the basis for geotargeting strategies However, to our knowledge, no one has examined the role of geodemographics in *channel* share of volume across product categories For example, are certain geodemographic clienteles more likely to shop at mass merchandisers?

Research Question 3 is, How do channel-category associations moderate the relationship between geodemographics and channel share of volume? Keller (1993) argues that different types of brand associations can interact, but heretofore no research has examined interaction effects of channel-category associations Besides the conceptual importance of this interaction, it is critical to managers who wish to coordinate their promotional efforts across channels If channel-category associations interact with user geodemographics, marketers in categories that are strongly associated with a certain channel need to tailor their integrated marketing communications strategy accordingly by allocating a larger portion of their trade efforts to that channel and by targeting consumers from the appropriate geodemographic groups (e g , a soft drink manufacturer may find it more profitable to promote differently to mass merchandiser buyers and club store buyers) This issue is important to public policy officials as well If lower sociodemographic groups tend toward higher-priced channels (e g , drugstores, convenience stores) for the categories associated with those channels, they experience a "double whammy" of lower incomes and higher prices

The rest of the article is organized as follows We begin by reviewing the channel patronage, brand association, and geodemographics literature We address the research questions in an empirical study by using correspondence analysis to determine the channel-category associations and by merging the results with data from a leading geodemographics data supplier We then analyze the effects of channel-category associations and geodemographics and their interactions on channel share of volume We conclude with a discussion of the findings' conceptual implications, the ways the findings might alter marketing practice, and directions for further research

Literature Review

Channel Patronage

The store patronage literature is relevant to an understanding of channel patronage Researchers have examined both the impact of store or shopping center attributes (e g , price level, convenience, quality, ambience) on patronage (e g , Arnold, Oum, and Tigert 1983, Louviere and Gaeth 1987, Nevin and Houston 1980) and temporal variations in store patronage behavior (e g , Kahn and Schmittlein 1989, Popkowski-Leszcyc and Timmermans 1997) Although this research has increased the understanding of the general factors that motivate store switching, it has neither explored differences in the evoked attributes or product categories across channels nor examined the geodemographic and behavioral drivers of channel patronage

Researchers (e g , Bell, Ho, and Tang 1998, Bell and Lattin 1998, Lal and Rao 1997, Popkowski-Leszcyc and Timmermans 1997) have examined the factors that influence consumer choice between grocery stores with different price formats (i e , everyday low price [EDLP] versus "high-lo" stores) In general, the results suggest that consumers with larger shopping lists (and concomitantly larger basket sizes) prefer EDLP stores Furthermore, consistent with retail location theory (e g , Huff 1962), consumers' affinity for a store tends to be inversely related to the distance thereto Bell, Ho, and Tang (1998) segment consumers in terms of the relative importance of fixed costs (e g , store loyalty, distance) and variable costs (e g , basket cost, category-specific store loyalty) They find that both fixed and variable costs influence consumers' choice of supermarket Zettelmeyer (2000) uses a game-theoretic approach of multichannel competition to conclude that firms can leverage multiple channels to achieve a more refined consumer segmentation However, he does not empirically examine whether different types of consumers shop at different channels Messinger and Narasimhan (1997) conclude that consumers seeking time-saving convenience have contributed to the growth in the one-stop shopping retail format over time Although these studies provide valuable insights, they have not addressed the issue of channel-category associations and how they might be related to channel share of volume

Channel-Category Associations

Researchers (e g , Aaker 1991, Keller 1993) have conceptualized associations using associative network models of memory (Anderson 1983, Collins and Loftus 1975) In this view, brand information stored in memory is represented as a network of interlinking nodes Specific bits of information are stored in each node, and the strength of the linkage between the bits is proportionate to the strength of the association between the nodes That is, the semantic relatedness between two nodes is represented by the strength of the association, which can be affected by factors such as advertising frequency and product experience For example, for most consumers, the linkage between McDonald's and fast food is probably stronger than the linkage between Arby's and fast food

In this view, likelihood of recall is driven by the "spreading activation" (e g , Collins and Loftus 1975) induced by either an external stimulus or some internal prompt Activation spreads from the activated node to other nodes as a function of the strength of the linkages between them That is, when a consumer considers the choice of a fast-food restaurant, McDonald's is more likely to come to mind than Arby's because of McDonald's greater association with fast food Other associations linked to McDonald's should then be evoked, such as hamburgers, efficient service, and so on Keller and Aaker (1992) show that core brand associations influence evaluations of brand extensions (see also Aaker and Keller 1990) They argue that the strength of this effect is driven by the accessibility of the associations from memory As we already discussed, this is a function of the association between the activated node and the brand

By extension to the context of channels, when the consumer is considering purchasing a given set of goods, the likelihood of a particular channel coming to the fore should be a function of the sum of its associations with each product category being considered and the specific features/benefits offered by each channel If the set of needs consists primarily of food products, the consumer arguably would evoke grocery store or club store Similarly, if time is of the essence, convenience or quick in and out (i e , features and benefits) may be the activated nodes, so convenience stores may come to the fore A unique aspect of the associative network model in this context is that the associations between the channel and entire product categories are important In the brand-level association models, the product category is often the activated node, and brands follow The reverse is the case here, channels follow from the activation

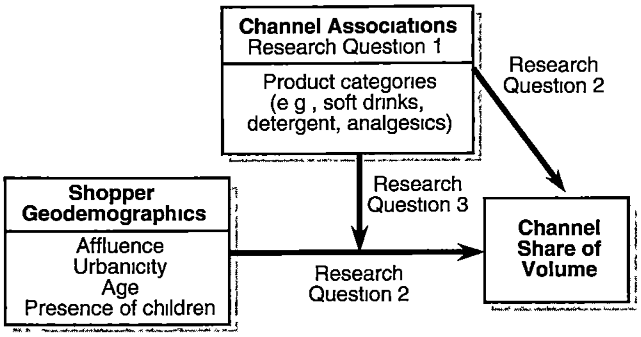
Although researchers have tended to focus on the conceptualization per se (e g , Keller 1993) or the process by which the associations are learned (e g , Janiszewski and van Osselaer 2000), our focus is on the nature of channel associations (Research Question 1) and the role of the associations in channel share of volume (Research Question 2) Specifically, although Keller (1993) describes user imagery as a type of association, we focus on empirically examining the direct effects of channel-category associations on channel share of volume and the interaction effects of the associations with shopper geodemographics (Research Question 3)

Geodemographics

Insights into the potential impact of geodemographics on channel choice can be gained from the research in structural sociology and marketing on behavioral differences along social class and other demographic lines People in different social classes differ not only in terms of the products they buy but also in terms of the type of store they frequent to buy products That is, shopping sites tend to take on fixed class identities (Miller et al 1998) For example, Martineau (1958) finds that the social status of a store often becomes the primary basis for its definition by the shopper Each store, even if it is a grocery store, acquires status identification Martineau's findings suggest that when making a store choice, the shopper goes to where he or she will "fit in" Although an entire market research subindustry has developed around the notion of geodemographic targeting (e g , Curry 1993), to our knowledge, no one has examined the role of geodemographics (i e , shopper characteristics) in channel share of volume across product categories, nor have researchers applied the conceptual associative network model as a moderator of this relationship

Although we agree that geodemographic effects on channel share of volume merit examination, we argue that it is also important to consider the potential moderating role of channel-category associations on this relationship Janiszewski and van Osselaer (2000, p 333) apply the connectionist model of memory (e g , Smith 1996) in the context of associations between brand name (i e , cue) and quality (i e , outcome), describing the connectionist model as having the desirable property that "the association strengths between each cue and an outcome depend on the association strengths between other cues and the same outcome" We extend this idea to the context of channel share of volume A household may tend to shop more heavily at one type of channel, perhaps because of proximity (e g , Huff 1962) or feelings of fitting in (Miller et al 1998) A systematic tendency for households with particular characteristics to shop at one channel more heavily than another results in a relationship between geodemographics and channel share of volume However, if channel-category associations are strong, a particular channel may be evoked when the household sets out to purchase a given set of goods This association should result in the attenuation of the geodemographic–channel share of volume relationship in favor of the evoked channel We argue that the strength of the channel-category association also results in a main effect of associations in channel share of volume Figure 1 provides an overview of the three research questions and the nature of the expected relationships

FIGURE 1
The Role of Channel-Category Associations in Channel Volume Share



In summary, we argue that channels are associated with certain types of product categories (e g , food items, household items, cosmetics) and a particular geodemographic customer base (e g , presence of children, affluence) Furthermore, category-channel associations and geodemographics should act in conjunction to drive channel share of volume More specifically, channels that are strongly associated with a product category should exhibit a weaker geodemographic–channel share of volume relationship

Empirical Study

Our purpose is to examine the drivers of consumers' tendency to shop at one type of channel, which we operationalize using channel share of volume as the dependent variable (which we subsequently define in detail) Our main independent variables are channel-category associations and geodemographic consumer-level factors Although researchers have consistently reported strong effects of consumer characteristics on category volume (e g , Dardis and Sandler 1971, Rich 1963) and reactions to marketing-mix variables (e g , Hoch et al 1995, Shankar and Bolton 2004), the literature offers little guidance on geodemographic factors that might influence channel share of volume Thus, our selection of geodemographic variables is admittedly exploratory and based on industry practice We employ a geodemographic segmentation database that segments consumers into a 54-cell lifestyle/life-stage grid and by channel (Figure 2) Specifically, we use Spectra software, which is used by many consumer goods firms that wish to target con-

FIGURE 2
Spectra Lifestyle/Life-Stage Descriptions

Lifestyle Descriptions

Upscale Suburbs 12 05%
- Major metro suburbs and urban fringe neighborhoods
- Top-end incomes, educations, and occupations

Traditional Families 9 56%
- Suburbs and outlying towns
- Mixed white collar/well-paid blue collar
- Upper-middle incomes and educations
- Typically dual-income households

Mid/Upscale Suburbs 9 88%
- Metro urban fringe locations
- Mixed single-unit and apartment neighborhoods
- Upper incomes and educations

Metro Elite 9 30%
- Urban and urban fringe
- Townhouse and high-rise apartment areas
- Above-average incomes and occupations, very high educations
- Younger, professional population

Working-Class Towns 13 69%
- Towns and outlying suburbs
- Mixed lower-level white collar, upper-level blue collar
- Middle-class incomes and educations

Lifestyle Descriptions

Rural Towns and Farms 13 27%
- Mill, factory, and mining towns with rural farm areas
- Middle to lower-middle incomes
- Predominately blue-collar occupations with farming
- Rust Belt mill towns and midwestern farmers

Mid-Urban Melting Pot· 8 29%
- Major metro urban and urban fringe
- Lower-level white collar and service occupations
- Mid to lower-middle incomes and strong ethnic presence

Downscale Rural 12 19%
- Rural towns, hamlets, villages, and farming areas
- Very low incomes and educations
- Light industry, textiles, and agriculture
- Strongly skewed to southeastern United States

Downscale Urban 11 77%
- Densely populated urban areas, most common in northeastern United States
- Very low incomes and educations
- Lower-level blue-collar and service occupations
- Strong ethnic presence

Life-Stage Descriptions

18–34 with kids	14 30%
18–34 without kids	12 75%
35–54 with kids	24 15%
35–54 without kids	14 44%
55–64	13 34%
65+	21 02%

Source Spectra (www spectramarketing com) Used with permission
Notes All percentages refer to U S population

sumers on a geodemographic basis We use Nielsen wand-panel data to populate the grid If firms find a skew such that certain lifestyle or life-stage groups are heavier consumers, they define this as the geodemographic target

The grid is composed of nine lifestyle rows, defined in terms of affluence and urbanicity, and six life-stage columns, defined in terms of age of the head of household (HOH) and the presence or absence of children As we mentioned previously, the grid can be populated with any variable, such as consumption (i e , annual volume per household), penetration (i e , percentage of households purchasing), or buying rate (i e , annual volume per purchasing household) A Spectra geodemographic grid for ground coffee purchased at grocery stores (annual household volume) is shown in Table 1

The rows in Table 1 are sorted in order of declining affluence Furthermore, the rows titled "Metro elite," "Mid-urban melting pot," and "Downscale urban" are more urban than the others The columns are in order of increasing HOH age, and households with HOH ages of 18–34 and 35–54 are broken out in terms of presence or absence of children In the example grid shown in Table 1, households with HOH ages of 55–64 tend to be heavier consumers of ground coffee through the grocery channel, their annual volume (122 0 oz per household) is much greater than the overall average (91 2 oz per household) Similarly, traditional families (104 9 oz per household) tend to be somewhat heavier purchasers of ground coffee through grocery stores

To prepare the data for this analysis, we computed channel share of volume for each cell in each grid by dividing the annual volume for that cell for each particular channel by the total annual volume for that cell across all channels For example, upscale suburban households with HOH ages of 18–34 with children (the upper-leftmost cell in the grid) purchased 77 7 ounces of coffee per household in the year 2000 across the four channels (grocery, mass, drug, and club) The channel share of volume of this geodemographic group was 70% for grocery, 9% for mass, 1% for drug, and 20% for club We now describe the geodemographic variables used in the analysis and explain how we derived the channel-category association dimensions

Operationalizing Geodemographics and Channel-Category Associations

Geodemographics The geodemographic variables that we examine are affluence, urbanicity, presence of children, and HOH age [2] The variables for urbanicity and presence of children were binary, and those for affluence and HOH age were continuous Specifically, we used information about the median annual income and urbanicity of the households in the nine Spectra lifestyle rows to define the affluence and urbanicity variables We used the median household income reported by Spectra for each row in the grid shown in Table 1 to specify the affluence variable Furthermore, we coded the rows in the grid as a one if the Spectra description in the database definition indicated an urban neighborhood (these are the rows titled "Mid/upscale suburbs," "Metro elite," "Mid-urban melting pot," and "Downscale urban") [3] We used the grid columns to define the presence-of-children indicator variable (i e , one if children were present and zero otherwise) Finally, we created the HOH age variable using the midpoint of the range in each column (i e , 26 for HOH

TABLE 1
Spectra Lifestyle/Life-Stage Grid for Grocery Store Consumption: Ground Coffee (Annual Ounces/Household)

	Ages 18–34		Ages 35–54				
Lifestyle	**With Children**	**No Children**	**With Children**	**No Children**	**Ages 55–64**	**Ages 65 and over**	**Total**
Upscale suburbs	54 2	44 4	95 6	86 0	111 0	130 3	93 8
Traditional families	75 8	40 3	105 0	106 6	135 9	122 3	104 9
Mid/upscale suburbs	74 8	29 1	101 8	86 0	128 8	115 0	99 1
Metro elite	45 3	28 5	85 1	69 9	103 4	117 6	74 6
Working-class towns	59 2	40 6	96 4	95 3	129 2	126 0	94 8
Rural towns and farms	49 3	34 4	86 6	97 4	131 8	122 9	92 8
Mid-urban melting pot	51 8	37 9	91 4	80 1	113 0	121 7	87 5
Downscale rural	64 0	31 2	101 8	100 0	130 8	121 9	101 0
Downscale urban	47 0	42 9	72 7	79 5	106 9	93 2	75 0
Total	56 8	36 2	93 3	87 9	122 0	118 4	91 2

Source Spectra (www spectramarketing com) Used with permission ages 18–34, 44.5 for HOH ages 35–54, 59.5 for HOH ages 55–64, and 70 for HOH ages of 65 and over).[4]

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[2] We tested for potential multicollinearity among independent variables The correlation matrix and variance inflation factors indicated that multicollinearity is not a problem

[3] It can be argued that some shoppers choose to live in urban or suburban areas on the basis of proximity to their desired channels, suggesting that urbanicity may be endogenous Although some people may locate close to channel locations because of channel characteristics, we believe that this is not a serious issue, because our dependent variable is channel volume share, not price or another channel attribute It seems unlikely that people would locate in urban or rural neighborhoods on the basis of channel share of volume in the neighborhood Moreover, geographic location is the only variable under consumers' real control (unlike demographic variables such as age or income) and is just one component of geodemographics Therefore, we do not believe that endogeneity is a major concern

Channel-category associations. Geodemographics were available directly from the Spectra database, but channel-category associations were not. Thus, we were forced to adopt a "data-fusion" approach, estimating channel-category associations from a different sample and then merging the results with the Spectra-supplied data. To do this, we used data provided by Meyers Research Center in New York. In the fall of 1999, 1698 consumers from five cities participated in a field-intercept survey. They were asked to indicate at which of the following channels they shop in a typical month (number of affirmative responses is shown in parentheses): supermarkets (1698), drugstores (1165), megastores such as Kmart or Wal-Mart supercenters (729), regular discount department stores such as Kmart, Wal-Mart, or Target (966), and warehouse club stores such as Costco or Sam's Club (351). It was important to select channels that carry a relatively common assortment of product categories; otherwise the construct of channel-category associations has little meaning.

Fazio, Williams, and Powell (2000) examine three general approaches for measuring association strength: naming methods, latency methods, and facilitation methods. They demonstrate that the methods converge in terms of assessing association strength. Because shoppers were interviewed in the field, the naming approach was more practical because the other two methods require a computer. In the naming method, respondents are presented with the stimulus (channel, in this case) and asked to recall items that they associate with that channel. Specifically, respondents were first asked to recall up to three product categories that they associate with each channel, followed by the first three words or thoughts other than product categories that come to mind. To mitigate the influence of previously recalled items, subjects were given a maximum number of three items to list (e.g., Farquhar and Herr 1993). As would be expected from an open-ended format, respondents mentioned a wide variety of categories: 113 for supermarkets, 100 for drugstores, 105 for superstores, 98 for regular mass merchandisers, and 107 for club stores.

The naming approach and the resulting perceptual-distance measure have both strengths and weaknesses. The strengths are that the measures enable us to capture memory and salience-based associations between channels and categories, reflect consumers' cognitive mapping of channels, and take into account consumers' attribute-based similarity judgments. The weakness is that some of the evoked associations from a consumer probably reflect the consumer's purchases at the different channels, so we must be cautious in interpreting their role in channel patronage decisions.

To identify the strength of the association between product categories and channels, we performed a correspondence analysis (see Hoffman and Franke 1986). Correspondence analysis is a mapping technique that uses cross-tabulation data as input (i.e., the number of product mentions for each channel) and converts the data into a joint space map by using the chi-square value for each cell. It is quite useful in this regard for several reasons. First, its ability to consider multiple categorical variables simultaneously enables us to map jointly the product categories elicited by the open-ended responses. Second, as with other graphical algorithms (e.g., multidimensional scaling, factor analysis), correspondence analysis aids in uncovering the structural relationship among the variables. Third, the only data requirement for correspondence analysis is a rectangular data matrix with nonnegative entries. Thus, it is perfectly suited for the open-ended elicitations that were the source of the data. Finally, correspondence analysis generates a dual display of both the columns (channels, in this case) and the rows (the products). The displays have similar interpretations, which facilitates the detection of relationships.

The primary caveat of correspondence analysis is that the specific distances between the row variables and column variables cannot be interpreted, because the distances do not represent a defined metric (Hoffman and Franke 1986). That is, the columns and rows are scaled independently, so (in our case) the channel scaling can be put through any monotonic transformation. Although the between-set distances cannot be strictly interpreted, a channel tends toward a position in its space that corresponds to the products that are the most prominent in its profile. In other words, the specific distances between the channels and the products should not be interpreted, but the ordinal proximity of particular products to certain channels has meaning. This is because any monotonic transformation of the channel scaling on the map maintains the ordinal distance from a particular category to the channels. For example, it is inappropriate to report that soft drinks are 1.5 units from the club channel and .9 units away from grocery, but any monotonic transformation of the channel scaling will leave soft drinks closer to grocery than to club in a relative sense.[5]

Both channels and products are plotted in Figure 3 (Figures 4 and 5 show expanded views of the two areas in Figure 3 in which several categories cluster). The analysis suggests that two dimensions (hereafter referred to as "association dimensions") adequately capture the variation in product mentions across channels. The vertical dimension captures 55% of the variance, and the horizontal association dimension captures 36%, for a total of 91% of the variance. Notably, a channel triangle is revealed, with the drug channel in the upper-left corner, the grocery channel at the bottom, and the superstores and regular mass merchandiser channels in the upper-right corner. The proximity of the superstores to regular mass merchandisers implies that consumers perceive them as quite similar in terms of the prod-

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[4] To test the robustness of our results to the operationalization of the geodemographic variables, we repeated the analyses for different categorical scale operationalizations of affluence, urbanicity, kids, and age. For example, because a linear coding may be unduly restrictive, we reestimated the model using three age dummy variables (one for 35–54, one for 54–65, and one for 65-and-over categories) for the main and nonlinear effects of age and all of the interactions. The adjusted R^2 for the analyses were almost identical, suggesting that our results are robust (e.g., the linear coding adequately captures the age effect).

[5] Thus, it is important that we use the category positions from the correspondence analysis rather than the distances from particular channels.

FIGURE 3
Correspondence Analysis Map of Categories and Channel Data

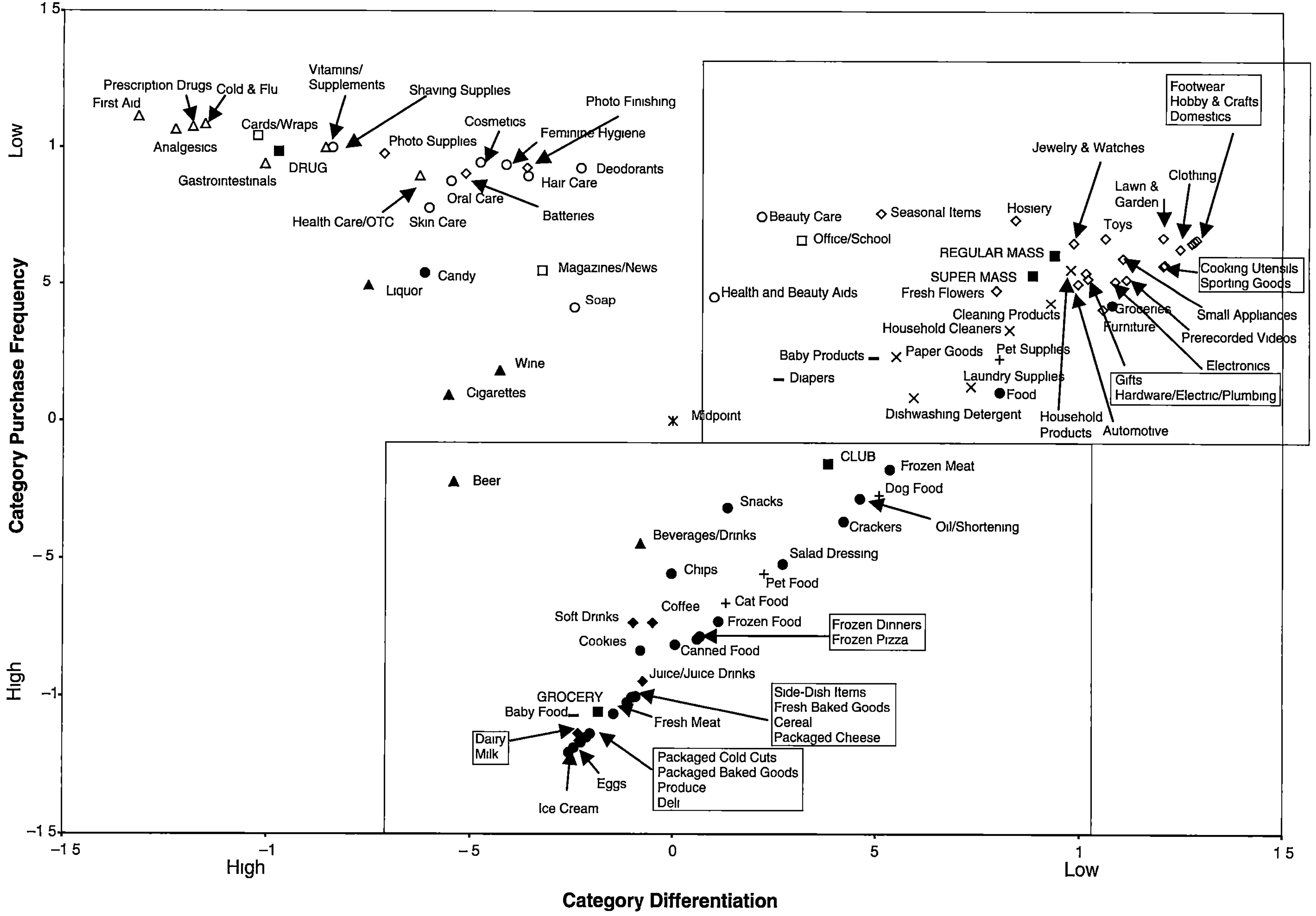


FIGURE 4
Correspondence Analysis Map of Categories and Channel Data: Upper-Right Quadrant

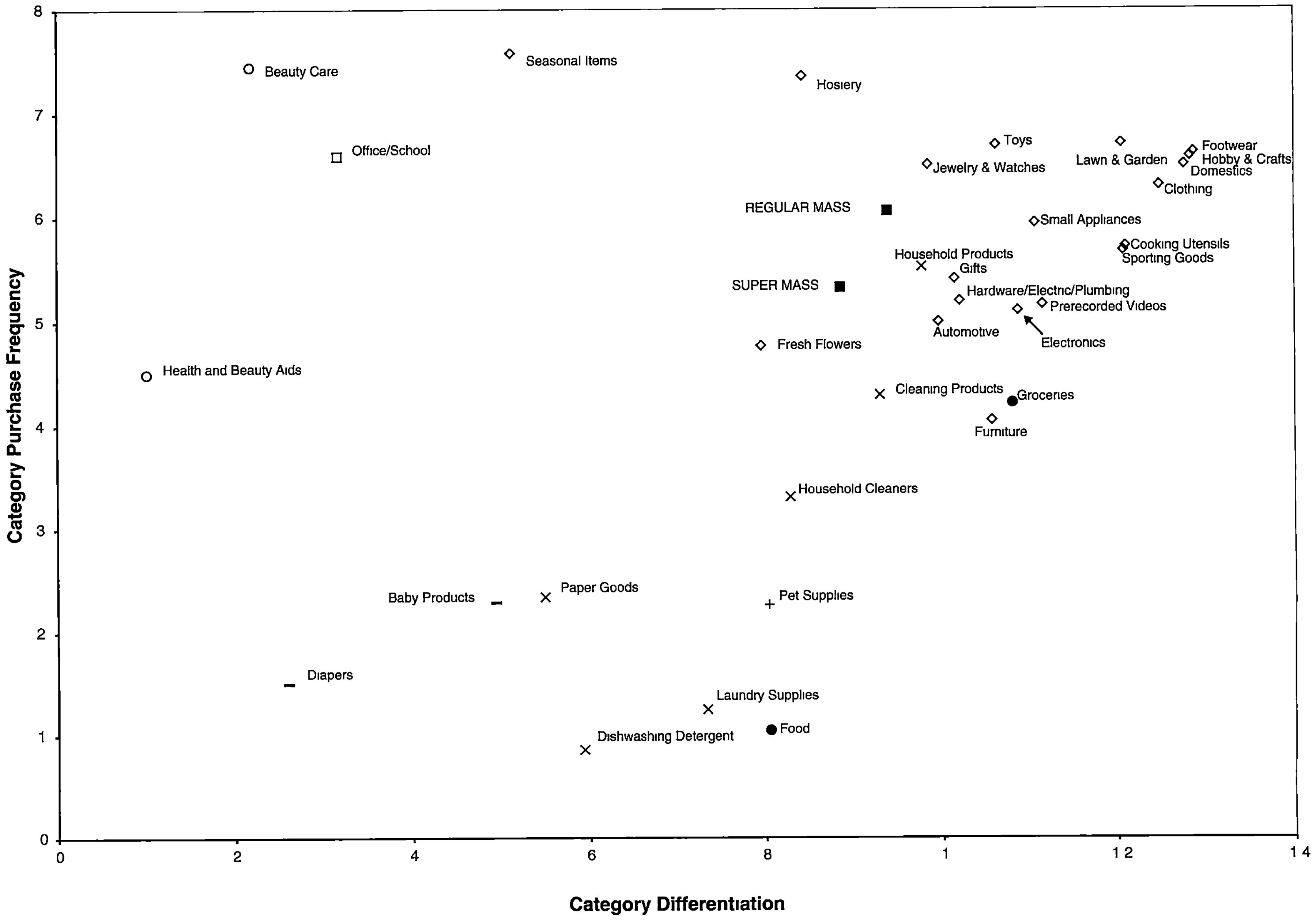
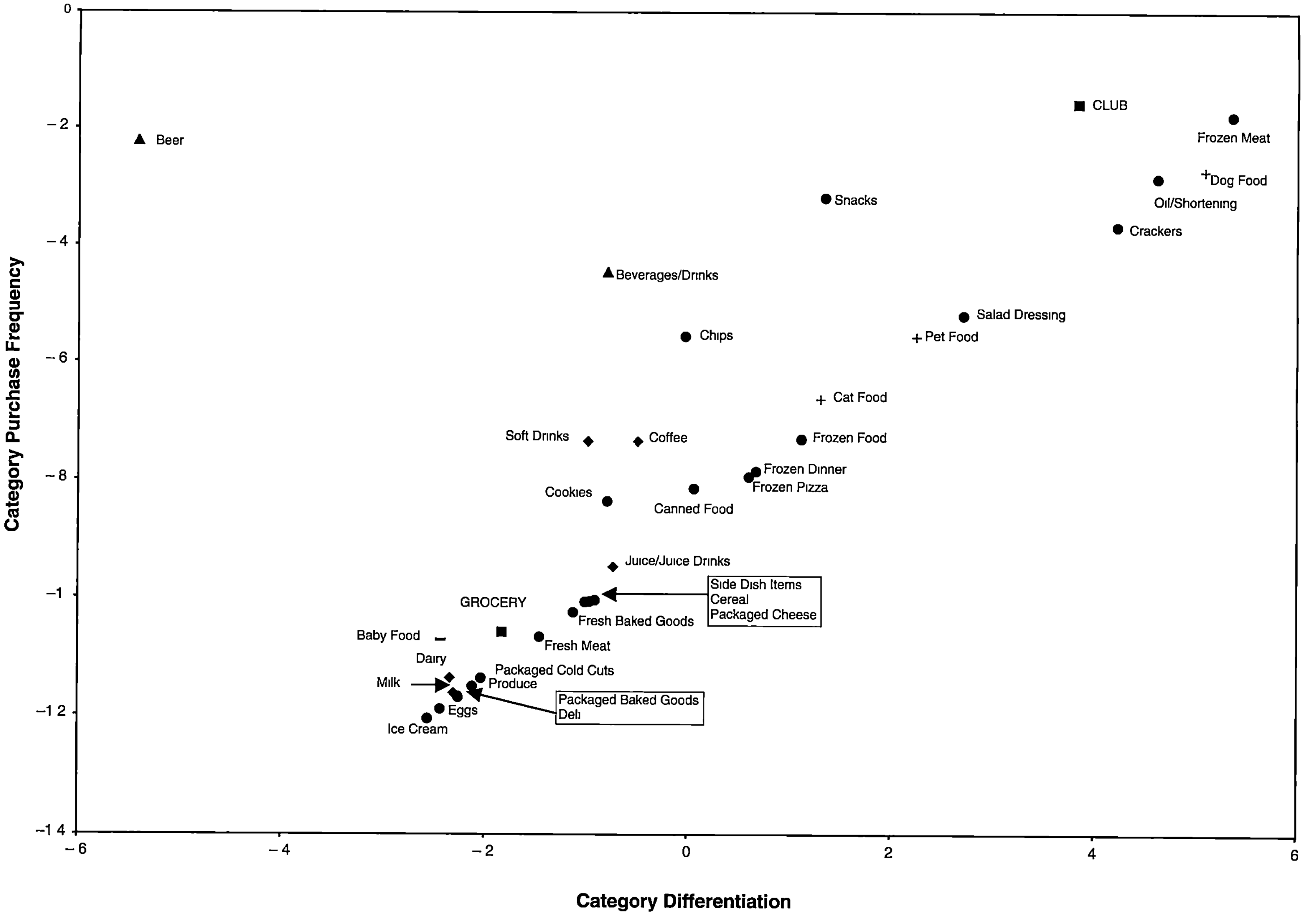


FIGURE 5
Correspondence Analysis Map of Categories and Channel Data: Lower Quadrants



ıcts that each evokes The club channel ıs located roughly ːquıdıstant between grocery and superstore/regular mass nerchandısers

For the product categories (see Figures 3–5), the food and beverage items tend toward the bottom of the plot The pet food and supplies are near the middle of the plot, as are the vice products (e g , liquor, cigarettes) Less differentiated, or "commodity," products such as general household items (e g , toys, clothing, lawn and garden supplies, domestics) and cleaning supplies tend toward the upper-right quadrant, whereas personal care products (e g , oral care, feminine hygiene, deodorants) and health-related categories (e g , cold and flu medication, analgesics, vitamins) are in the upper-left quadrant Grocery tends to be more closely associated with food items, drug is associated with personal care and health-related categories, club tends to bring food items and pet supplies to mind, and the two mass merchandiser channels are associated with less differentiated, infrequently purchased general household items Thus, we labeled the vertical dimension "category purchase frequency," with less frequently purchased items in the upper portion, and the horizontal dimension "category differentiation," with less differentiated products on the right-hand side This analysis identifies which categories are associated with which channel, thus addressing Research Question 1 Table 2 shows the product category associations along the two dimensions The results are relevant to the positioning of channels with respect to the products they carry

Several channel-category associations uncovered from correspondence analysis are novel and somewhat counterintuitive Table 3 provides a summary of the associations and the relevant rationale The drug channel is closely associated with categories such as alcohol, tobacco, candy, magazines, and soap, which are not intuitively obvious Alcohol and cigarettes are associated more with the drug channel than with the other channels, though the drug channel is associated with health-related products The likely reason is that consumers perceive the attributes that are key to the purchase of these categories (convenience, selection, and service) as superior at the drug channel than at the other channels (Inman, Shankar, and Ferraro 2002) Candy is associated with the drug channel more than with other channels, particularly the grocery channel, with which food items are typically associated Candy is bought on impulse, and it may be more convenient to buy candy at or close to the checkout at the drug channel because the basket sizes are typically smaller in this channel than in the grocery channel The rationale for associations of categories such as magazines, photo supplies, and soap are provided in Table 3

Consumers perceive the mass merchandiser channel as the closest channel for categories such as automotive, beauty care, cleaning products, gifts, miscellaneous household items, and paper goods Cleaning products are more closely linked to the mass merchandiser channel than to the grocery or the club channel Because these items are storable and frequently consumed, prices and selection are important Although club stores typically offer good prices, the selection is not as wide as it is in mass merchandiser stores, and whereas grocery stores offer wide selection, they do not typically offer lower prices than mass merchandiser stores Table 3 offers a rationale for the associations of other categories to mass merchandiser stores

Club stores are strongly associated with bulk foods, frozen foods, pet foods, and snacks Shoppers typically buy the same brands of pet foods for their pets, because they do not like to change the brands to which their pets have grown accustomed Therefore, repeat purchases are important for these foods Because club stores offer some of the best prices for a given brand or set of brands, they are more closely associated with pet foods than are other channels Bulk foods, frozen foods, and snacks are also purchased by affluent and, often times, stressed-out shoppers (the geodemographic clientele of club stores), who may buy large quantities at low prices so that they do not need to make multiple shopping trips

Analytical Approach

We merged the measures of channel-category dimensions from the correspondence analysis with the geodemographics database and performed a regression analysis to study the roles of channel-category associations and geodemographics on channel patronage An aspect of the Spectra system that is suitable for our purpose is that the consumption grids (annual volume per 100 households) are available by channel (e g , Table 1 is for grocery) That is, we were able to generate separate grids for grocery (73), mass merchandiser (74), drug (63), and club (59) stores

We tried to generate consumption grids for each of the categories identified in the field study that yielded the channel-category dimensions Unfortunately, there was not a one-to-one mapping of all the categories from the field study in the Spectra database For example, the household cleaners category is not in the database, so we used two less-abstract categories bathroom cleaners and floor cleaners Furthermore, superstore mass merchandisers and regular mass merchandisers are not broken out separately in the Spectra database We did not view this as a serious limitation, because the consumers questioned in the field study perceived the two channels as similar Thus, we attempted to extract a separate category-channel grid for each category across four channels (club, drug, grocery, and mass) The final database consists of 269 category-channel grids across 74 product categories (see Table 2) and yields 14,526 observations (269 grids × 54 cells per grid)

We performed the analysis in two ways (1) a pooled analysis of all the observations from the channel-category Spectra grids and (2) a hierarchical regression analysis, consistent with previous research (e g , Bolton 1989, Bolton and Shankar 2003) The pooled regression enabled us to examine the relative effects of each group of factors—namely, type of channel, channel-category associations, geodemographics, and all the possible interactions (three two-way interactions and one three-way interaction)—in one model and to draw insights from them The hierarchical regression serves as a robustness check Because the hierarchical regressions are similar to the pooled regression, we report only the pooled regression results[6] The general equation that we estimate is the following

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[6] The hierarchical results are available from the authors

(1) SOV = f(channel effects, geodemographic effects, association effects, two-way interactions, three-way interactions),

where SOV is the channel share of volume The channel effects include those of the mass merchandiser, club store, and drug channels relative to the grocery channel, the association effects include the effects of the channel-category association dimensions (purchase frequency and differentiation), and the geodemographic effects include the effects of affluence, urbanicity, HOH age, and presence of children The specific equation is

$$
\begin{aligned}
(2)\quad \mathrm{SOV}_{ijk} = {} & \alpha_0 + \alpha_1\mathrm{MASS}_{ijk} + \alpha_2\mathrm{DRUG}_{ijk} + \alpha_3\mathrm{CLUB}_{ijk} \\
& + \beta_1\mathrm{AFF}_{ijk} + \beta_2\mathrm{URB}_{ijk} + \beta_3\mathrm{KIDS}_{ijk} + \beta_4\mathrm{AGE}_{ijk} \\
& + \gamma_1\mathrm{PFREQ}_{ijk} + \gamma_2\mathrm{DIFF}_{ijk} + \sum_{m=1}^{8}\delta_m\mathrm{DGINT}_{mijk} \\
& + \sum_{m=1}^{12}\phi_m\mathrm{CGINT}_{mijk} + \sum_{m=1}^{6}\varphi_m\mathrm{CDINT}_{mijk} \\
& + \sum_{m=1}^{24}\lambda_m\mathrm{CDGINT}_{mijk} + \varepsilon_{ijk},
\end{aligned}
$$

where i, j, and k represent category, channel, and geodemographic group, respectively, MASS, DRUG, and CLUB are dummy variables that denote whether the observation is from mass merchandiser, drug, or club channels, respectively, AFF represents affluence, URB denotes urbanicity, KIDS represents presence of children in the household, and AGE denotes age of HOH The variables PFREQ and DIFF measure purchase frequency and differentiation, the channel-category association dimensions as obtained from the correspondence analysis DGINT is an interaction variable involving channel-category dimensions and geodemographics, CGINT is an interaction variable involving channel and geodemographics, CDINT is an interaction variable involving channel and channel-category dimensions, and CDGINT is an interaction variable involving channel, channel-category dimensions, and geodemographics The variable ε is an error term, and α, β, γ, δ, ϕ, φ, and λ are parameters associated with the variables [7]

Results

We now discuss the significant effects in the pooled regression model As is shown in Equation 1, the interpretation of the channel-interaction coefficients is relative to the grocery channel (i e , grocery is the baseline channel) Furthermore, Dimension 1 is the vertical channel-category association dimension from the correspondence analysis (see Figure 3) that we named "category purchase frequency" Dimension 2 is the horizontal dimension, which we interpreted as "category differentiation" As is shown in Figure 3, each of the dimensions ranges between approximately –1 2 and 1 2 Table 2 lists the categories that scored relatively high and low in the two dimensions

Table 4 shows the individual parameter estimates Our second research question seeks to examine the direct effects of channel-category associations and geodemographics on channel share of volume Specifically, we argue that the channel-category associations should have a significant, direct impact on channel share of volume This thesis is strongly supported, because the base effects (with the channel indicator variables all set to zero) are substantive and significant Furthermore, the effects of the channel-category associations on volume share vary widely across the channels (i e , all six channel × association parameters are significant) The effect of purchase frequency ranges from – 357 for grocery to 334 for mass (Table 5 breaks out the results by channel), and the effect of differentiation ranges from – 138 for grocery to 160 for mass The higher the purchase frequency at a channel, the higher is the channel share of volume, the more a category is differentiated from other categories in a channel, the higher is the channel share of volume

Our results also suggest that geodemographic effects vary quite a bit across channels (i e , geodemographic × channel interactions), 8 of the 12 geodemographic × channel parameters are significant The implications are that in terms of affluence, presence of children, and HOH age, the grocery and club channels are equivalent, but club stores attract fewer urban shoppers (i e , the urbanicity × club interaction is negative) Mass merchandisers draw a younger, less affluent, and more rural clientele with children (all four geodemographics × mass parameters are significant) On average, drugstores tend to attract less affluent, older shoppers without children

In the discussion of Research Question 3, we argue that the channel-category associations moderate the geodemographic–channel volume share relationship (i e , the two-way geodemographic × category-channel associations interactions and the three-way geodemographic × category-channel associations × channel interactions) This thesis is supported, 5 of the 8 possible two-way interactions and 9 of the 24 possible three-way interactions are statistically significant (at $p <$ 01) The 14 significant effects are split relatively evenly across the two association dimensions (8 for purchase frequency and 6 for differentiation) Moreover, 4 of the significant three-way interactions involve the mass merchandiser channel, and the other 5 involve the drug channel As is evident in the two-way geodemographics and channel results, mass merchandiser and drugstore clienteles are different from those of grocery, but club and grocery clienteles are similar

We also argue that the channel-category associations interact with channel such that channels enjoy a greater volume share for categories with which they are more associated This is strongly supported, all six of the association × channel interactions are statistically significant As we predicted, mass merchandisers' volume share is buoyed for the

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[7] We acknowledge that a limitation of our approach is that the individual channel-share estimates may not be logically consistent (i e , strictly between zero and one) and that the sum of the channel shares is not constrained to sum to one However, Inman (1990) reports that parameters estimated with a set of constrained share equations were substantively identical to parameters estimated with an unconstrained set of equations Thus, we do not believe that this represents a serious concern

TABLE 2
Product Categories and Correspondence Analysis Dimensions

Purchase Frequency	Differentiation	
	Low	High
Low	Automotive (*oil, engine treatments*) Beauty care (*lipstick, nail polish*) Cleaning products (*bathroom, floor cleaners*) Clothing Cooking utensils (*kitchen utensils*) Domestics Electronics (*computer software*) Footwear Fresh flowers/plants Furniture Gifts Groceries Health and beauty aids Hair care (*shampoo*) Hosiery Household cleaners Hardware/electric/plumbing (*light bulbs*) Jewelry and watches *Lawn and garden* *Office/school supplies* *Prerecorded videos/tapes* *Seasonal items* *Small appliances* *Sporting goods/toys*	*Analgesics* *Batteries* Candy (*chocolate*) Cards/wraps/party (*egg coloring, candles*) *Cold and flu medications* Cosmetics (*cosmetic kits*) *Deodorants* Feminine hygiene (*sanitary napkins*) First aid supplies (*bandages, treatments*) Gastrointestinal products (*antacids*) Health care/OTC medications (*arthritis*) Hobby and crafts *Liquor* Magazines/newspapers Oral care (*toothpaste*) Photo finishing Photo supplies (*film*) Prescription drugs Shaving supplies (*razors*) *Skin care* *Soap* *Vitamins/supplements*
High	Baby products (*baby bath*) Canned food (*vegetables*) *Cat food* *Crackers* *Diapers* *Dishwashing detergent* *Dog food* Food *Frozen dinners* *Frozen foods* *Frozen meat* *Frozen pizza* Household products Laundry supplies (*detergent*) *Oil/shortening* *Paper goods* Pet food Pet supplies *Salad dressing* Snacks	*Baby food* *Beer*/wine Beverages/drinks *Cereal* Chips (*potato chips*) *Cigarettes* *Coffee* *Cookies* Dairy (*butter*) Deli (*deli meat*) *Eggs* Fresh baked goods *Fresh meat* *Ice cream* *Juice/juice drinks* *Milk* Packaged baked goods (*bread*) *Packaged cheese* Packaged cold cuts Produce (*lettuce*) Side-dish items (*frozen potatoes, bagged rice*) Soft drinks

Notes: Categories used in estimation are in italics.

categories that are more closely associated with mass merchandisers (i.e., as is shown in Figure 4, low category-purchase frequency/low category differentiation). Club's volume share is relatively unaffected by the associations (see Table 4), which makes sense because its position near the center of Figure 3 indicates relatively weak category associations. Finally, drug's volume share is greater for the categories with which it enjoys a closer association (i.e., per Figure 3, low category-purchase frequency/high category differentiation).

Across the four channels there are 60 parameters, which makes interpretation of the results somewhat arduous. In an effort to simplify the exposition, we compiled Table 5, which shows the net channel share equation for each channel (i.e., setting the channel-indicator variables appropriately in Equation 1). Because grocery is the base channel, the model intercept, the geodemographics main effects, the channel-category association main effects, and the two-way interaction between geodemographics and the channel-category associations represent the estimate of grocery

TABLE 3
Surprising Channel-Category Associations and Their Rationales

Category	Closest Associated Channel(s)	Rationale
Alcohol	Drug	Although the drug channel is perceived as closest to health-related products, it is also perceived as an ideal channel for alcohol, likely because of superior convenience, selection, and service attributes compared with those of other channels (Inman et al 2002)
Automotive	Mass	Although club and drugstores carry auto supplies (which are infrequently purchased search goods), auto products are perceived as closer to mass merchandisers, likely because of broader selection
Beauty care	Mass, drug	Purchases of beauty care items are generally hedonic, and the mass merchandiser channel offers greater selection and convenience than the other channels
Candy	Drug	Candy is an impulse purchase item, and purchases at drugstores are of smaller basket sizes than are those at other channels Therefore, it is easier to buy more candy at or close to the checkout in the drug channel without substantially increasing the weight of purchases
Cigarettes	Drug	Although the drug channel is perceived as closest to health-related products, it is also perceived as an ideal channel for cigarettes, likely because of superior convenience, selection, and less crowded ambience (and thus reduced visibility) compared with those of other channels
Cleaning products	Mass	Cleaning products are storable but frequently consumed Mass merchandisers are likely to offer both favorable prices and wider selection than are other types of retailers
Cosmetics	Drug	Cosmetics are more price inelastic but display elastic A drug channel is better positioned than other retailers in these aspects
Diapers	Mass, grocery	Diapers are storable, frequently purchased items Although club stores can offer lower prices, the mass and grocery channels attract more buyers with children and offer wider selection and convenience for frequent use than the club channel
Feminine hygiene	Drug	The drug channel is most attractive for these items because of the superior convenience, selection, and greater privacy (less crowded) than other channels
Bulk foods	Mass, club	Prices are critical determinants of foods purchased in bulk Mass and club are perceived as better than the other channels in price
Gifts	Mass	Gifts are planned purchases, so consumers search for the best selection and prices The mass merchandiser channel is best positioned in these attributes relative to the other channels
Magazines/ newspapers	Drug	Magazines and newspapers are bought on either a frequent basis or impulse Drugstores are perceived as ideal for both attributes
Miscellaneous household items	Mass	Miscellaneous household items are typically storable but infrequently purchased Mass merchandisers are likely to offer more favorable prices than other types of stores and more location convenience than club stores
Paper goods	Mass	Paper products such as paper and bath towels and tissues are highly storable and consumed items Prices and selection are important Mass merchandisers are perceived as ideal on these attributes
Pet foods	Club	Repeat brand purchase and prices are important for pet foods Club stores are perceived to be ideal on these attributes
Photo supplies	Drug	Although mass merchandisers and club stores can offer better prices on super-sized packs, drugstores deliver faster on photo processing and promote these items, so they are perceived as more synonymous with photo supplies than other channels
Snacks	Grocery, club	Grocery stores are the logical choice for food-related items However, frequently consumed snacks such as potato chips, cookies, and crackers are also storable and used for party occasions Prices are most critical for such purchases, so the club store is an ideal channel
Soap	Drug	Soaps are frequently purchased and consumed items Although the grocery channel has lower prices on these than the drug channel, the drug channel offers more convenience and can evoke soaps in consumers' baskets better because of the drug channel's and soap's association with cosmetics

Notes The data should be interpreted such that a given category (Column 1) provides the channel with the strongest association (Column 2) and explains why the channel is associated most strongly with the category (Column 3)

TABLE 4
Results of Pooled Regression Analysis of Channel Share of Volume

	Param-eter	Stan-dard Error	RSSCP	Group RSSCP
Intercept	508**	007		
Geodemographics				.32
Affluence	001**	000	19	
Urbanicity	042**	003	13	
Children	– 002	004	00	
Age	000	000	00	
Channel Type				28.33
Mass	– 056**	010	96	
Drug	– 489**	011	14 58	
Club	– 476**	011	12 79	
Association Dimensions				27.19
Purchase frequency[a]	– 357**	009	25 00	
Differentiation[a]	– 138**	011	2 19	
Dimension–Geodemographic Interaction				.27
Affluence × purchase frequency	001**	000	05	
Affluence × differentiation	000	000	00	
Urbanicity × purchase frequency	012*	004	01	
Urbanicity × differentiation	016*	005	02	
Kids × purchase frequency	012*	005	01	
Kids × differentiation	– 010	006	00	
Age × purchase frequency	000	000	02	
Age × differentiation	001**	000	15	
Channel–Geodemographic Interactions				1 34
Affluence × mass	– 003**	000	62	
Affluence × drug	– 001**	000	04	
Affluence × club	000	000	01	
Urbanicity × mass	– 124**	005	52	
Urbanicity × drug	– 007	005	00	
Urbanicity × club	– 030**	005	03	
Kids × mass	014*	006	01	
Kids × drug	– 015*	006	00	
Kids × club	009	006	00	
Age × mass	– 001**	000	05	
Age × drug	001**	000	06	
Age × club	000	000	01	

	Param-eter	Stan-dard Error	RSSCP	Group RSSCP
Dimensions–Channel Interactions				41.96
Club × purchase frequency	369**	013	6 19	
Drug × purchase frequency	382**	014	7 18	
Mass × purchase frequency	691**	013	24 73	
Club × differentiation	139**	017	48	
Drug × differentiation	115**	016	30	
Mass × differentiation	298**	015	3 08	
Three-Way Interactions				.60
Affluence × club × purchase frequency	– 000	000	00	
Affluence × drug × purchase frequency	– 000	000	00	
Affluence × mass × purchase frequency	– 001**	000	11	
Affluence × club × differentiation	000	000	00	
Affluence × drug × differentiation	– 000	000	00	
Affluence × mass × differentiation	– 000	000	00	
Urbanicity × club × purchase frequency	– 009	006	00	
Urbanicity × drug × purchase frequency	023**	007	01	
Urbanicity × mass × purchase frequency	– 057**	006	08	
Urbanicity × club × differentiation	– 009	008	00	
Urbanicity × drug × differentiation	– 040**	008	03	
Urbanicity × mass × differentiation	– 011	007	00	
Kids × club × purchase frequency	– 016	007	00	
Kids × drug × purchase frequency	– 032**	008	02	
Kids × mass × purchase frequency	– 002	007	00	
Kids × club × differentiation	013	009	00	
Kids × drug × differentiation	027*	009	01	
Kids × mass × differentiation	002	009	00	
Age × club × purchase frequency	– 000	000	00	
Age × drug × purchase frequency	000	000	01	
Age × mass × purchase frequency	– 001**	000	11	
Age × club × differentiation	– 001	000	01	
Age × drug × differentiation	– 002**	000	10	
Age × mass × differentiation	– 001**	000	09	

*$p < 01$

**$p < 0001$

[a] We measured Association Dimensions 1 and 2 such that the higher the value of the dimension, the lower are the purchase frequency and differentiation, respectively

Notes Adjusted R^2 = 86, n = 14,526, RSSCP = relative squared standardized coefficient percentage

TABLE 5
Estimated Channel Share Sensitivity
(Based on Parameter Estimates)

	Grocery			Mass Merchandisers			Club			Drug		
	Main Effect	Purchase-Frequency Interaction	Differentiation Interaction	Main Effect	Purchase-Frequency Interaction	Differentiation Interaction	Main Effect	Purchase-Frequency Interaction	Differentiation Interaction	Main Effect	Purchase-Frequency Interaction	Differentiation Interaction
Intercept	508			452			032			019		
Purchase frequency	– 357			334			012			025		
Differentiation	– 138			160			001			– 023		
Affluence	001	001	000	– 002	– 001	000	001	000	000	000	000	– 000
Urbanicity	042	012	016	– 082	– 045	005	012	003	008	034	035	– 023
Children	– 002	012	– 011	012	011	– 008	007	– 003	003	– 017	– 019	016
Age	000	000	001	– 001	– 001	– 001	000	000	000	001	001	001

channel share of volume (i e , the channel dummy variables are all set to zero so that all the nongrocery terms drop out) Because the dependent variable is channel volume share, the magnitude and direction of a coefficient may indicate that the impact of the channel and the channel-category association interactions are (1) in the same direction as grocery but weaker/stronger or (2) in the opposite direction as grocery With the mass merchandiser equation as an example, the share sensitivity intercept (452) represents the sum of the model intercept (i e , 508) and the mass merchandiser indicator parameter (– 056) Similarly, the urbanicity × purchase-frequency effect (– 045) is the sum of the urbanicity × purchase-frequency interaction (012) and the three-way mass merchandiser × urbanicity × purchase-frequency interaction (– 057)

Grocery Grocery enjoys the greatest base share (i e , the largest intercept) However, the dimensions affect grocery's average volume share substantially Because the channel-category association dimensions range between –1 2 and 1 2, the purchase-frequency parameter of – 357 indicates that the grocery channel's share of volume is approximately 86% (i e , 508 + 357) for categories with a purchase-frequency value of –1 0 and only 15% for categories with a purchase-frequency value of 1 0 (when we control for the other variables) Similarly, differentiation affects grocery's share of volume, albeit to a much lower degree (b = – 138) Grocery's share for a category with a differentiation value of –1 0 is approximately 65%, but it is only 37% for a category with a differentiation value of 1 0 For the geodemographic variables, only affluence and urbanicity exert a significant effect on grocery's volume share The positive values of the parameters indicate that more-affluent shoppers and more-urban shoppers tend to satisfy their needs in the grocery channel Furthermore, the interactions between affluence and urbanicity with purchase frequency indicate that this attraction is even stronger for the categories that are more closely associated with grocery (higher purchase-frequency categories) The effects of presence of children and HOH age are weak, only two of the four parameters achieved significance Households with children tend to shop at grocery stores for frequently purchased categories (i e , the kids × purchase-frequency interaction is positive and significant), and older consumers tend to shop at grocery for categories that are more differentiated (i e , the age × differentiation interaction is positive and significant)

Mass merchandisers Mass merchandisers present a much different picture than grocery does It is not much of an exaggeration to note that mass merchandisers attract the opposite clientele of grocery Both channel-category association dimension parameters are positive and significant The net effect is that mass merchandisers would enjoy a 79% share (i e , 452 + 334) for categories with a purchase-frequency value of 1 0 and only a 12% share for categories with a purchase-frequency value of –1 0 The effect of differentiation is less but still substantial, mass merchandiser share ranges from 61% for categories with a differentiation value of 1 0 to 29% for categories with a differentiation value of –1 0

Notably, all the geodemographic effects are statistically different from grocery, and three are of the opposite sign Mass merchandisers attract less affluent, more rural households than does grocery, and the households tend to be younger and to have children Furthermore, three of the four interactions with purchase frequency are significant and negative This implies that younger, less affluent, rural households are attracted to mass merchandisers for infrequently purchased categories These tend to be nonfood categories, a traditional strength of mass merchandisers Only one interaction with differentiation is significant that with age This means that younger households are attracted to mass merchandisers for categories that are less differentiated

Club stores The geodemographic profile of club stores is quite similar to that of grocery, but the role of the channel-category association dimensions is attenuated The base share of club is only 3% on average (i e , the intercept is 032), and the channel-category association dimensions serve to shift this by a relatively small amount Club realizes a 4% share for categories with a purchase-frequency value of 1 0 and a 2% share for categories with a purchase-frequency value of –1 0 The effect of differentiation on club share is practically nil (i e , the differentiation parameter of – 138 is negated by the club × differentiation interaction of 139) This makes intuitive sense, because the club channel is located near the center of Figure 3, which suggests that it is not particularly associated with many product categories Furthermore, only 1 of the 12 geodemographic parameters is significant urbanicity Compared with grocery stores, club stores attract a slightly less urban shopper This is probably the result of club stores being located in suburbs, which are not quite urban and not quite rural In summary, club's share of channel volume is small but relatively stable across product categories

Drugstores The drug channel's base share (the intercept) is small, at approximately 2% Given the size of the base share, the effects of the channel-category association dimensions and the geodemographics are rather limited The effects of the two channel-category association dimensions are almost the same magnitude but in opposite directions (025 for purchase frequency and – 023 for differentiation) This implies that drug benefits the most from the categories that are relatively more closely associated with drug, that is, products that are relatively more differentiated and purchased infrequently (e g , health-related products) For example, drug has a predicted 4% share for a category with a purchase-frequency value of 1 0 (019 + 025) and for a category with a differentiation value of –1 0 (019 + 023)

Regarding geodemographics, drugstore shoppers are less likely to have children, and they tend to be older than shoppers in other channels That is, households without children exhibit a drug-channel share that, on average, is 1 7% (parameter value of – 017) greater than households with children, whereas a household with HOH age of 65 has a predicted drug-channel share that is 3 1% greater than a household with HOH age of 26 (i e , 65 × 001 – 26 × 001) The affluence parameters are the smallest of all channels, the significance of the two-way affluence × drug interaction deflates the affluence effect for drugstores (i e , drugstore shoppers tend to be less affluent in general) In contrast, urban shoppers are more likely to patronize a drugstore, which increases the expected share by more than 3% The geodemographic × association dimensions' interactions mirror those of the association dimensions' main effects, and the signs reverse across the dimensions This implies that drug's volume share benefits from categories with which it is more closely associated (more differentiated and infrequently purchased) among more urban, older households without children

Discussion

Taken together, the results of the empirical study provide insight into the three research questions we posed in the introduction First, for channel-category associations, the channels form a channel triangle in which drug, mass merchandisers, and grocery are near the vertices and club stores are in the middle Each vertex is associated with certain product categories the grocery channel with food products, the drug channel with medications and health-related products, and the mass merchandiser channel with household items In contrast, the club channel exhibits more heterogeneity in terms of product categories that readily come to consumers' minds In a relative sense, frozen foods, pet foods, and snack items are most closely associated with the club channel, cleaning supplies, automotive, gifts, beauty care, miscellaneous household items, and paper goods are most closely related to the mass merchandiser channel, and tobacco, alcohol, candy, magazines, and soaps are perceived as closest to the drug channel

The correspondence analysis reveals important new insights into the channel-category associations For example, animal or pet products map closer to the club channel than to other channels, though a substantial portion of pet food is sold in grocery and mass merchandiser channels (e g , according to the Nielsen wand panel in 2000, 32% of dry cat and dog food was sold through mass merchandisers, and 54% was sold through grocery stores) Furthermore, miscellaneous items such as hosiery and beauty aids are more closely associated with the mass merchandiser channel, though the drug channel carries many of these items Cleaning supply items are more closely associated with the mass merchandiser channel than with the club channel, though club stores sell a sizable amount of cleaning supplies Notably, vice products, such as cigarettes and alcohol, are closest to the drug channel, despite the fact that the drug channel's signature products are health care and medical items and that other channels sell a high amount of vice products (e g , drug's share of cigarette and liquor sales was 7% and 22%, respectively)

Second, channel share of volume depends directly on the geodemographic factors of affluence and urbanicity and indirectly on all four geodemographic factors (i e , affluence, urbanicity, presence of children, and HOH age) Drug channel share of volume tends to be driven by older, more urban households without children, and mass merchandiser share of volume is driven by younger, less affluent, nonurban households with children The drivers of club share of volume factors tend to be quite similar to those of grocery Notably, the geodemographic groups exhibit the "polygamous loyalty" that Dowling and Uncles (1997) identify, that is, they split their loyalty across multiple channels Furthermore, the relative variation in the channel splitting varies across categories, depending on the associations of product categories with the channels

Third, our findings suggest that the channel-category associations influence channel share of volume both directly and indirectly Figure 6 is a Venn diagram that depicts the percentage of total variation in channel volume share that is attributable to the three factors examined here (channel-category associations, channel, and geodemographics) The strong role of channel-category associations is clear, the associations explain 72% of variation in channel share of volume (when we sum across the main effects and all the interactions) Notably, the lion's share of this explanatory effect derives from the interaction with channel, which accounts for 43% of the total explained variance In sharp contrast to their role in a specific category (Curry 1993), geodemographics explain only a small proportion of variation in volume share across categories and channels, contributing to only approximately 2% of explained variance This illustrates the importance of channel-category associations in driving channel volume and emphasizes that it is imperative to consider these associations when mapping out a channel strategy

FIGURE 6

Venn Diagram of Relative Squared Standardized Coefficient Percentages of Channel Type, Geodemographics, and Channel-Category Associations on Channel Volume Share

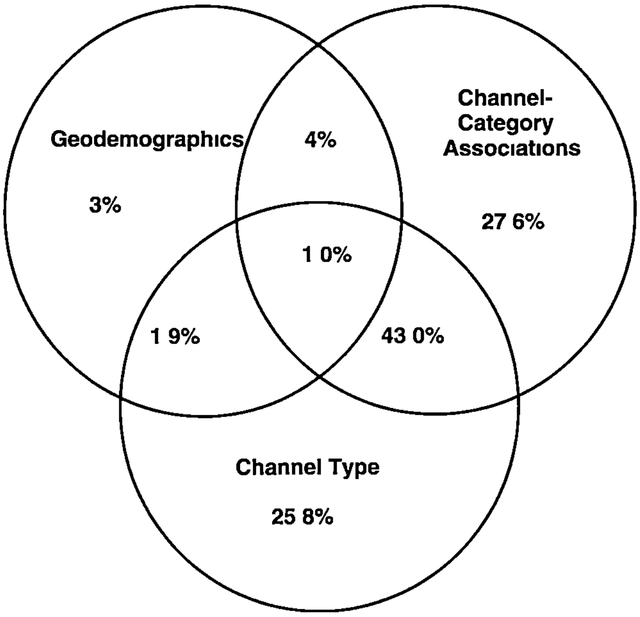

Illustration of Channel Share of Volume

To illustrate the sensitivity of channel share of volume to the variables, we examined the range in channel volume share across the four channels for four different product categories Referring to Figure 3, we selected a hypothetical category at the middle of the map (where the two association dimensions are zero) and one near each corner of the channel triangle These are health care/over-the-counter (OTC) medications near the upper-left-hand vertex (purchase frequency = 90, differentiation = – 63), juices near the lower vertex (purchase frequency = – 95, differentiation = – 07), and cleaning supplies near the upper-right-hand vertex (purchase frequency = 43, differentiation = 93) The estimation of the range of share for each channel for each category was a two-step process We began by inserting the appropriate values for the association dimensions and channels into the regression results We then used the solver function in Excel to determine the maximum possible share for each channel given the range of possible geodemographic values (e g , urbanicity is 0 or 1, age ranges between 26 and 65) The results of the illustration are shown in Table 6

The wide variation in channel share as a function of the channel-category associations is readily apparent The maximum expected share of grocery ranges from 43% for the health care/OTC category to 91% for juices (the category with which it enjoys the strongest association), and mass merchandisers' maximum expected share ranges from a low of only 12% for juices to a high of 68% for cleaning supplies (the category with which it enjoys the closest association) Similarly, the maximum expected share of drug varies from a low of 1% for juices to a high of 31% for health care/OTC (with which it is most closely associated), whereas club's maximum expected share ranges from 9% for juices to 19% for cleaning supplies Club's share does not exhibit as much variability across categories, which is a direct outcome of its central location on the map

Notably, the geodemographic factors create a rather wide range of expected shares across the channels and categories For example, based on the level of the geodemographic factors, the maximum share of grocery for a category in the center of Figure 3 is ten share points greater than the minimum expected share (62% versus 52%) This difference between the maximum and minimum expected shares is replicated across categories and channels Thus, although the geodemographics explain a relatively small percentage of the variation, they play a substantial role in driving channel volume and deserve managerial attention

Managerial Implications

Although the results of our study are not normative, several insights emerge from our analysis A summary of the linkages among the channels, channel-category associations, geodemographic clientele, interaction effects of the associations and geodemographics, and managerial implications appears in Table 7 The overarching takeaway is that though each channel has its own associated product categories and clienteles, the interaction of the associations and geodemographics offers valuable managerial guidelines for channel-category targeting and promotion decisions

In addition to the implications highlighted in Table 7, the findings have several managerial implications First, our results suggest that the geodemographics–channel relationship should not be generalized across product categories without taking category-channel perceptions into account That is, managers should assess the importance of this relationship in light of the strength of the associations between their product category and the channels through which it is sold Therefore, retailers' marketing to geodemographic groups should be specific to product categories and dependent on the extent of category association with that channel

Second, it may be the case that the tailoring of integrated marketing communications efforts across channels would increase profits For channels in which there is a strong

TABLE 6
Illustration of Range in Channel Share

	Grocery	Mass	Drug	Club
Map Midpoint[a]				
Maximum share	62	41	13	12
Minimum share	52	17	03	05
Health care/OTC				
Maximum share	43	60	31	12
Minimum share	27	23	07	06
Juices				
Maximum share	91	12	01	09
Minimum share	82	01	0	04
Cleaning Supplies				
Maximum share	44	68	09	19
Minimum share	26	37	02	07

[a]We estimated maximum share and minimum share on the basis of the category's position in the correspondence analysis map (Figure 3) as well as the most favorable and least favorable geodemographics

TABLE 7
Links Among Channels' Categories, Geodemographics, Share Drivers, and Managerial Implications

Channel	Some Closely Associated Categories	Typical Geodemographic Profile of Shoppers	Interaction Effects of Associations and Geodemographics on Channel Share of Volume	Managerial Implications
Grocery	Food, diapers, frozen foods, snacks (high frequency, high/low differentiation)	Affluent, urban, middle-aged shoppers with average family size	Positive effects of urbanicity and affluence are attenuated for high-purchase-frequency and high-differentiation categories Households with (without) children tend to shop at grocery for categories purchased less (more) frequently Older (younger) customers shop at grocery channel for less (more) differentiated categories	Rather than geotargeting the average grocery consumer, managers should market to customer groups for categories that exhibit low differentiation and high frequency differently from those for other categories
Drug	Health care/OTC, alcohol, candy, beauty care, cigarettes, cosmetics, feminine hygiene, magazines/newspapers, soap (low frequency, high differentiation)	Less affluent, urban, older shoppers without children	Drug's volume share benefits from categories with which it is more closely associated (more differentiated and infrequently purchased) among more urban, older households without children	Because differentiated and infrequently purchased categories such as candy, cosmetics, and magazines provide more share of volume, drug-channel managers can promote these items to their geodemographic clientele
Mass	Cleaning products, automotive, beauty care, diapers, bulk food, gifts, household items, paper goods (low frequency, low differentiation	Less affluent, rural, younger shoppers with children	Younger, less affluent, rural households are attracted to mass merchandisers for infrequently purchased categories Younger households are attracted to mass merchandisers for categories that are less differentiated	Mass channel can gain significant share by focusing on low-frequency, low-differentiation categories such as cleaning products, household items, and gifts aimed at rural, less wealthy, and younger shoppers
Club	Pet foods, bulk food, frozen foods, snacks (high frequency, low differentiation)	Affluent, less urban, middle-aged shoppers with average family size	The interaction effects are similar to those of the grocery channel, but club's share of volume is higher for rural customers for infrequently purchased and highly differentiated categories	It is easier for club-channel managers to increase traffic by reinforcing the associated categories, such as pet foods and snacks, and by targeting rural shoppers rather than typical destination categories to avoid direct competition with the grocery channel

product association, manufacturers and retailers can leverage that association for competitive advantage For example, household items are associated more with mass merchandisers Mass merchandisers can use this knowledge to promote the items in order to reinforce their association with the products, and they can locate the items strategically to try to spur in-store need recognition (Inman and Winer 1998) and leverage interproduct complementarities (Shocker, Bayus, and Kim 2003) Similarly, club stores can promote snack items to capitalize on their association with these categories In contrast, because mass merchandisers know that the association between their channel and household products is secure, they can move toward securing an association between their channel and other products

From a public policy standpoint, the households patronizing lower-priced channels such as club stores tend to be more affluent, which may partially be a result of access and knowledge of prices in different channels Less affluent households are less likely to have transportation to club stores and thereby suffer a double whammy of less affluence and higher prices This is compounded by the tendency of club and grocery stores to be located in suburbs It is noteworthy that less affluent rural households do not suffer from this price disadvantage, they have more ready access to mass merchandisers, particularly Wal-Mart, which tends to locate stores in small towns Older, more-urban people tend to shop at drugstores, possibly because they dislike travel or are less price sensitive

Further Research

Our findings should be viewed as a first step toward a better understanding of channel shopping behavior, because they suggest several directions for further research First, our analysis was at the category and channel levels It may be that certain brands in a category fare better in some channels than in others, perhaps as a function of the match between the target consumer and the channel's shopper base For example, Target may be associated with more-upscale brands than Wal-Mart This hypothesis remains unexplored This type of association may be related to a deeper investigation of channel-category associations from a consumer behavior standpoint Experimental investigation of consumer perceptions of channels and their associations with categories, and vice versa, would be useful in this regard

Second, the role of urbanicity in channel share of volume can be explored in greater depth by examining recent channel-purchase data As more mass merchandiser and club stores locate near urban areas, the negative relationship between urbanicity and share of volume of these channels may be weakened This hypothesis can be tested with data from urban neighborhoods that have witnessed an increase in the number of mass merchandisers and club stores

Third, the role of retail branding in channel-category associations and their effects on channel patronage deserve greater attention For example, Wal-Mart now has different channels mass merchandiser (Wal-Mart), hypermarket (Wal-Mart Supercenter), and grocery (Wal-Mart Neighborhood) The associations of a product category may extend from one channel to other channels if Wal-Mart branding is common across the channels These changes in channel-category associations may have noteworthy effects on channel patronage This possibility can be tested with the help of data from areas in which Wal-Mart operates in multiple channels

Finally, our analysis has examined channel associations and their role in channel share of volume at a single point in time If longitudinal data were available, it would be useful to explore the evolution of channel-category and channel-attribute associations over time For example, mass merchandisers are devoting increasing amounts of shelf space to food items This may lead to a "drift" of these items toward mass merchandisers and would help address the issue of the direction of the relationship between channels and particular product categories It would also be worthwhile to determine how channel-service associations evolve as services become more common (e g , banking, dry cleaning) in these channels

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Glen L. Urban & John R. Hauser

"Listening In" to Find and Explore New Combinations of Customer Needs

By "listening in" to ongoing dialogues between customers and Web-based virtual advisers (e g , Kelley Blue Book's Auto Choice Advisor), the authors identify new product opportunities based on new combinations of customer needs The data are available at little incremental cost and provide the scale necessary for complex products (e g , 148 trucks and 129 customer needs in the authors' application) The authors describe and evaluate the methodologies with formal analysis, Monte Carlo simulation (calibrated on real data), and a "proof-of-concept" application in the pickup-truck category (more than 1000 Web-based respondents) The application identified opportunities for new truck platforms worth approximately $2 4 billion–$3 2 billion and $1 billion–$2 billion, respectively

> Identifying new platform opportunities is one of the most important roles of market intelligence Monitoring [Web-based advisers] provides a rich source of observed in-market customer behavior that complements our current inquiry tools that, by their nature, are forced to ask customers either to state their intentions before they are actually in the market or to remember after the purchase what they did (and why) when shopping for a vehicle No form of inquiry is perfect, however, whatever its limitations, the currency [of Web-based advisers] presents a valuable source of market understanding that is already streaming by and is of great value when used appropriately
> —Vince Barabba, General Manager of Corporate Strategy and Knowledge Development, General Motors

The advent of the Internet has given customers more information about products in diverse industries such as travel, health, automobiles, computers, home entertainment, and financial services For example, the percentage of people using the Internet for information and advice is high in travel (70%), health (56%), and automobiles (62%) The monitoring of Internet searches, undertaken by potential customers in their own vested interests, has the potential to reveal new opportunities for new products and product platforms In this article, we explore a set of methodologies to use this information to identify new product opportunities Although our application is drawn from the automotive industry, the basic concepts are applicable to complex products in both consumer and business-to-business markets, such as high-end copiers, home entertainment centers, and financial services (Ulrich and Eppinger 1995)

Automobiles and trucks are indeed complex products The investment for a new automotive platform can require as much as $1 billion–$2 billion and 1200 person-years of investment Such investments are justified by the scale of the market For example, with approximately 150 brands of truck on the market, the average truck needs less than 1% of the marketplace to be profitable, each share point is worth $800 million in annual revenue

Most automotive platforms are redesigns to provide known combinations of customer benefits (i e , needs) However, long-term survival requires that new opportunities be identified For example, in the late 1980s, through a combination of qualitative focus groups and quantitative perceptual mapping studies, a new opportunity was identified for luxury vehicles that could haul moderate loads Today, the luxury sport-utility-vehicle segment is one of the most profitable automotive segments Another new product example came from leading-edge users In the 1960s, teenagers and young adults were customizing inexpensive vintage Fords with V8 engines Ford recognized the opportunity for inexpensive, sporty cars with large engines The first production car in this "pony" segment, the 1964½ Mustang, sold 420,000 units in the first year ($10 billion in today's prices, ClassicPonyCars com 2002) The 1983 Chrysler minivans are another example Growing families needed a vehicle that could carry a 4′ × 8′ sheet of plywood, fit easily in their garages, drive like a passenger car, have a side door for small children, and incorporate a sedanlike liftgate for shopping Chrysler sold 210,000 units in the first year and dominated the new segment for years to come (Allpar com 2003) These are but some of the many automotive examples in which profitable new platforms filled previously unrecognized (by the auto industry) combinations of consumer needs The firms that first identified the new combinations

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of customer needs were able to exploit the opportunities profitably for many years

Identification of new combinations of customer needs for complex products is no small challenge For example, trucks fulfill between 100 and 150 distinct customer needs, and even more if sound and other subsystems are included Because of the sheer magnitude of combinatorial combinations (e g , 10^{52} in our application), existing products fulfill a tiny fraction of the potential combinations Complex products require large samples For example, even if we had hypotheses about a new combination of customer needs, we might still need detailed information on almost 500 or more respondents to be comfortable that a needs-combination segment is worth further investigation Because multiple needs define a segment, it is not unusual for sample sizes in the automotive industry to approach 10,000 for targeted research and 100,000 for general searches General Motors (GM) alone spends tens of millions of dollars each year searching for new needs combinations and studying needs combinations when they have been identified Some studies are in the cost range of $500,000 to $1 million Automotive firms desire methodologies that are more cost effective and that can be run continuously to identify new needs-combination opportunities as soon as they occur

In this article, we propose methodologies that provide a practical means to find combinations of customer needs that represent profitable new opportunities The methodologies exploit new data (i e , clickstreams from virtual advisers) that are available at little incremental cost but provide the scale (both number of products and number of needs) that is necessary to find opportunities in complex-product categories For example, there is a virtual adviser sponsored by GM, J D Power, Kelley Blue Book, and Car Talk and partly based on the methodologies in this article that has approximately 500,000 annual visitors

We obtained the new data by "listening in" to ongoing dialogues created when customers use the Internet to search for information and advice about automotive purchases The data are incentive compatible Customers are seeking advice and have an incentive to reveal their needs The virtual advisers generating the data are updated often to include new products and new customer benefits (needs), providing evolving data with which to identify new combinations of needs as soon as customers express them We focus on the truck market to illustrate the methods The methodologies extend readily to other complex-product categories, such as travel, medical, and office equipment

We listen in by combining multiple stages a Bayesian virtual adviser to obtain the data, an opportunity trigger to identify when existing trucks do not fulfill desired combinations of needs, a virtual engineer to explore and clarify the identified opportunity, a design palette to explore how customers would design their own trucks, and a clustering procedure to estimate the (rough) size of the segment of customers who desire the new combinations of needs In this article, we illustrate each stage, examine internal validity with Monte Carlo analyses, and provide an example based on a sample of more than 1000 respondents This "proof-of-concept" research was performed parallel to existing methods, yet it identified a key segment at a much lower cost It also implied the existence of a segment, still being explored, that existing methods may have missed We begin by discussing how listening in complements existing methods

Existing Methods to Identify Profitable Combinations of Customer Needs

Because so much is at stake, strategic marketing and marketing research groups invest heavily in identifying new opportunities They speak to leading-edge users, maintain and monitor user groups, sponsor special racing events, monitor chat rooms and user groups, and use various qualitative and ethnographic methods (Barabba 2004, Barabba and Zaltman 1991, Griffin and Hauser 1993, Gutman 1992) For example, automotive firms invest heavily in quantitative methods such as conjoint analyses, activities, interests, and opinions (AIO) studies, and large-scale "clinics" in which customers view and react to prototypes and concepts (Green and Srinivasan 1990, Plummer 1974, Urban, Weinberg, and Hauser 1996) Table 1 summarizes characteristics of existing methods and listening in The cost and sample-size data are typical for the automotive industry, they are based on our experience and discussions with auto executives and consultants [1]

The methods in Table 1 are complementary For example, qualitative and ethnography interviews are powerful methods to probe in-depth once the research is focused, but they are an expensive means to search for combinations of needs that might be desired by less than 1% of the market Conjoint analyses provide accurate estimates of the importance of customer needs, but they are most effective when they are targeted to approximately 10 to 20 needs Even adaptive methods cannot handle all the needs that describe a truck Furthermore, AIO studies are designed to examine the entire market for new combinations of needs, but they are expensive, performed infrequently, and tend not to collect data on gaps in customer needs In contrast, AIO studies provide critical input to virtual advisers Truck clinics provide the most realistic stimuli to customers They are designed carefully to forecast sales before launch, but their primary use is confirmatory rather than exploratory

Listening in fills a gap in existing methods by making it feasible to use inexpensive and readily available data to search large numbers of customer needs to find combinations of customer needs that are desired but not currently fulfilled by existing trucks More important, unlike AIO studies, listening in can immediately and automatically target both quantitative and qualitative questions to explore further the new combinations of customer needs Because listening in runs continuously and is updated periodically with new vehicles and benefits (needs), it provides an early warning of new needs-combination segments as soon as they appear in the market

Tailored interviewing (TI) has characteristics that are similar to the Bayesian virtual adviser Both TI and the vir-

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[1] Table 1 also includes tailored interviewing, an approach that shows promise for automotive applications, especially for the segmentation gearbox used in the virtual adviser

TABLE 1
Complementary Methods for Understanding Customer-Needs Combinations: Truck Example

	Data Source	Incremental Cost per Study	Number of Features or Stated Needs per Study	Number of Vehicles per Study	Number of Feature Combinations	Includes In-Depth Probes
Qualitative and ethnographic interviews[a]	5–10 groups of 5–10 customers per segment	$40,000–$50,000	50–100	5–10	Open-ended	Yes
Tailored Interviews[b]						
Segmentation	800 personal interviews	$80,000	73 scales	7 segments	—	—
Interest or intent	512 (calibration) and 235 mail questionnaires	$10,000–$15,000	12–15 items (Phase 2)	Single scale	—	—
AIO studies[a]	100,000 mailed questionnaires	$500,000	114	150	—	—
Conjoint analyses[a]	300 online or in-person interviews	$50,000–$100,000	10–20	5–10	10^{6}	—
Truck clinics[a]	300 central-facility personal interviews	$500,000	40–50	10–20	—	Yes
Listening in[c]						
Bayesian adviser	Track online	$10,000–$20,000	36	148	—	—
Opportunity trigger	Track online	Included	—	—	10^{15}	—
Virtual engineer	Invite online	Included	79	—	10^{31}	Yes
Design palette	Invite online	Included	14	—	10^{6}	—
Clustering	Track online	Included	—	—	—	—

[a] Data are as cited in article and/or typical for the automotive industry We rounded some estimates for confidentiality

[b] Data are from the work of Kamakura and Wedel (1995) and Singh, Howell, and Rhoads (1990) Automotive cost estimates are based on sample sizes in *Journal of Marketing Research* articles Cost per respondent is typical for the industry, as is estimated by auto industry executives and consultants

[c] Experience is based on the pilot study The numbers of vehicles, needs, and combinations may increase in subsequent applications

tual adviser classify respondents (e g , into seven segments, as in the work of Kamakura and Wedel [1995], into three most preferred trucks [of 148] in our application) There are other technical differences that we discuss in the next section A key conceptual difference is that to be practical in the truck market, the virtual adviser must be updated almost continuously as new trucks enter the market or as new features are added to the question banks Although both methods assign respondents with posterior probabilities, the virtual adviser relies on Bayesian methods to update probabilities and uses data from multiple sources, whereas TI relies on a calibration survey and uses maximum-likelihood methods (Kamakura and Wedel 1995, Equations 3–7) Each method works well in its target application

Listening in is not a panacea, nor can it operate without complementary methods For example, although the virtual engineer contains qualitative probes, subsequent qualitative and ethnographic research provides greater depth on a segment when it has been identified Similarly, when new needs combinations have been uncovered, conjoint analyses search the combinations in greater detail and quantify the importance of the alternative needs Although listening in provides first-order forecasts, truck clinics provide the accuracy necessary before $1 billion–$2 billion is committed to a project We illustrate in a stylized way how listening in complements existing methods for two practical situations in truck markets In practice, applications are more iterative and include other methods (Urban and Hauser 1993)

Identify opportunities for a new truck platform
  Listening in ⇒ qualitative interviews ⇒ conjoint analysis ⇒ truck clinics ⇒ launch

Monitor marketplace changes for vehicle "refresh" opportunities
  Listening in ⇒ conjoint analysis ⇒ truck clinics ⇒ launch

Tapping Data from Virtual Advisers (Web-Based Searches)

Virtual-adviser data are extensive, available at little incremental cost, and underused as a means to identify unfulfilled combinations of customer needs Web sites such as Kelley Blue Book (http //www kbb com), Microsoft Autos (http // autos msn com), Edmund's (http //www edmunds com), Autobytel (http //www autobytel com), Autoweb (http // www autoweb com), NADA (http //www nadaguides com), and Vehix (http //www vehix com) have changed the way that customers search for information on cars and trucks Of all new-vehicle buyers, 62% search online before buying a vehicle (J D Power and Associates 2001) This search rate has increased from 54% in 2000 and from 40% in 1999 The most important and most accessed Internet content is information about vehicle options and features Notably, although customers prefer independent sites for pricing and general evaluation, they prefer manufacturers' sites, by more than a two-to-one margin, for feature and option information (J D Power and Associates 2001, p E16)

Virtual advisers come in many varieties, including comparators, which array choice alternatives by features (Epinions com), feature-specifiers, which ask consumers for preferred levels of features and search the database for products that meet the feature specifications (Kelly Blue Book's online recommendation tool), configurators with detailed specifications and costs for the chosen set of detailed product features (http //configurator carprices com/autoadvisors), collaborative filters, which recommend products based on correlations of previous purchases by similar customers (Amazon com), and utility maximizers, which use methods similar to conjoint analysis to weight features (Activebuyersguide com) Other advisers use real people who consumers can access by e-mail (Mayohealth org) or in live chat rooms (Nordstom com)

The listening-in methodology relies on data from a Bayesian virtual adviser, which is a method that is well-matched to the opportunity trigger mechanism However, the virtual engineer, the design palette, and the clustering are not limited to working with a Bayesian virtual adviser These methodologies can work with any virtual adviser that provides recommendations at any point in the questioning sequence and that links customers' responses to benefits that the customers derive from vehicles

A Bayesian Virtual Adviser

The Bayesian virtual adviser was developed as a prototype for a major automotive manufacturer, a commercial system based, in part, on this adviser is now in place on the Web This virtual adviser combines two methods to recommend a set of four vehicles to customers a segmentation gearbox and a Bayesian adviser The segmentation gearbox divides people into segments on the basis of grouping and assignment rules[2] The grouping is based on a cluster analysis of a 114-item AIO questionnaire sent to 100,000 respondents (76 personal viewpoints and 38 preferred vehicle characteristics, including styling and design) The automotive manufacturer's AIO study identified 48 segments, of which 25 were relevant to pickup trucks Customers were assigned to segments on the basis of answers about their desires for features and options such as comfort, passenger capacity, and prestige as well as about their anticipated use of the truck In the virtual adviser, one of the four recommended vehicles was the vehicle bought most often by the segment to which the customer was assigned However, because the segmentation gearbox is designed to allocate people to segments rather than identify new opportunities, it is not the focus of this article Instead, we focus on the Bayesian adviser that recommends three of the four vehicles

Bayesian Adviser

The basic concepts behind the Bayesian adviser are (1) to select sets of questions, known as question banks, such that the answers provide the most information about which vehicle to recommend and (2) to update the probabilities that describe the likelihoods that each vehicle will be most preferred by the customer after each question bank [3] Figure 1, Panel A, illustrates the opening screen of the virtual adviser (a neighbor who is a contractor and who has bought many trucks over the years), and Figure 1, Panel B, illustrates one of the question banks asked of customers We describe the Bayesian updating mechanism and then describe how it can be used to select the maximum-information question bank We subsequently indicate how we obtained both the conditional and the prior probabilities

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[2] The industry term "gearbox" is an analogy Just as the gearbox in a car matches engine speed to wheel speed, the segmentation questions match the manufacturer's vehicles to the customer

We begin with the notation We let Q be a set of question banks indexed from $q = 1$ to N For each question bank, q, r_q indexes the potential responses to that question bank, where r_q is a nominal variable with values from 1 to n_q If there is more than one question in a question bank, n_q represents the number of possible combinations of answers If one of the questions includes a continuous sliding scale, it is discretized to a finite number of categories

For each customer, the order of the question banks is chosen adaptively For a given customer, R_{q-1} is the set of question banks up to but not including question bank q The variable v_j indicates vehicles from 1 to V At any point in the adviser's questioning sequence, we are interested in the likelihood that the customer will prefer vehicle j after having been asked question bank q We indicate this likelihood by $P(v_j|R_{q-1}, r_q)$

Suppose that from previous surveys, we have available the conditional probabilities of how customers, who prefer each vehicle, will answer the question banks We then can use Bayes' theorem to update recommendations [4]

$$(1) \quad P(v_j \mid R_{q-1}, r_q) = \frac{P(r_q \mid v_j, R_{q-1}) P(v_j \mid R_{q-1})}{\sum_{j=1}^{V} P(r_q \mid v_j, R_{q-1}) P(v_j \mid R_{q-1})},$$

where $P(v_j|R_{q-1})$ is the virtual adviser's recommendation probability to the customer for vehicle v_j before asking the qth question bank

However, even with data from full-scale surveys, such as an AIO questionnaire with 100,000 responses, use of Equation 1 is not feasible because the number of potential combinations of responses grows exponentially with the number of question banks For example, in our study, the dimensionality of R_N, the number of unique paths through the adviser's questions, is $1\ 4 \times 10^{15}$ Fortunately, we can make Equation 1 feasible based on the property of local independence This property appears reasonable for our data and has proved robust in simulations and applications in the TI literature (e g , Kamakura and Wedel 1995, Equation 11, Singh, Howell, and Rhoades 1990, Equation 8) Local independence recognizes that there are nonzero correlations across vehicles in the answers to the question banks, customers who prefer a full-sized truck may also prefer a diesel engine Indeed, it is this combination of preferences on which the adviser bases its recommendations However, if we limit ourselves to customers who prefer a Ford F350 Supercab, for those customers, responses to the "size" question bank are approximately statistically independent of the responses to the "engine type" question bank This enables us to write $P(r_q, R_{q-1}| v_j) \cong P(r_q|v_j)\, P(r_{q-1}|v_j) \quad P(r_1|v_j)$, which implies that $P(r_q|v_j) \cong P(r_q|v_j, R_{q-1})$ by the laws of conditional probability Using this property, we rewrite Equation 1, in which we recursively obtain $P(v_j|R_{q-1})$, as follows

$$(2) \quad P(v_j \mid R_{q-1}, r_q) \cong \frac{P(r_q \mid v_j) P(v_j \mid R_{q-1})}{\sum_{j=1}^{V} P(r_q \mid v_j) P(v_j \mid R_{q-1})}$$

Figure 2 gives a simplified example for one customer of the evolution of the recommendation probability The current recommendation is on the left-hand side, and the probability that the customer will purchase that recommended vehicle is on the right-hand side Also listed on the left-hand side are the question bank and parts of the answer For example, after the second question bank on engine size, the customer answers "four cylinders " If the customer were to stop answering question banks and request a recommendation, the adviser would recommend the Mazda B2300 and forecast a 0735 probability that the customer would purchase the Mazda B2300 In Figure 2, the probability of purchase increases for the most preferred truck after each question bank is answered Note that the recommended vehicle changes after the fifth question bank and again after the eighth question bank

Question Bank Selection

To select the next question bank, the virtual adviser attempts to gain as much information as possible from the customer For example, if after reviewing the responses, the adviser decides that a question bank on towing capacity is likely to make one truck more highly probable and all other trucks less probable, that question bank might be a good candidate to ask next To do this, we turn to formal theory in which information is defined as the logarithm of the relative odds (e g , Gallagher 1968) That is, the information, $I(v_j|r_q, R_{q-1})$, provided by the response to question bank q equals $\log [P(v_j|R_{q-1}, r_q)/P(v_j|R_{q-1})]$ This definition has several nice theoretical properties, including that (1) under an equal proportional loss rule, information always increases when the probability of the maximum-choice truck increases, (2) the expected information is maximized for the true probabilities, and (3) the information measure rewards systems that provide more finely grained estimates (Kullback 1954, Savage 1971) [5]

To compute the expected information, we take the expectation over all possible responses to question bank q and over all possible vehicles The information that we expect from question bank q is given in Equation 3

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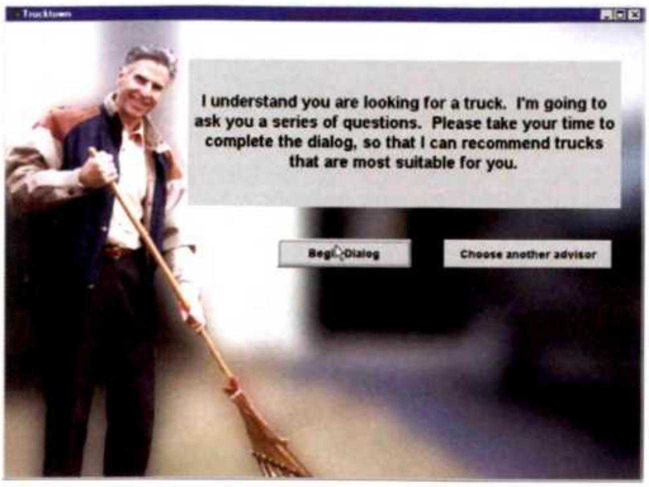
[3] The global set of question banks from which the algorithm selects is drawn from cluster analyses of the ongoing AIO surveys, supplemented with managerial judgment The set of question banks evolves on the basis of ongoing market intelligence These methods are state of the art but standard marketing research practice They are not the focus of this article

[4] In most equations, we suppress the individual customer subscript, i, for simplicity

[5] For applications in marketing of reward functions based on information theory, see Hauser (1978) and Herniter (1973) For applications in psychology, see Prelec (2001)

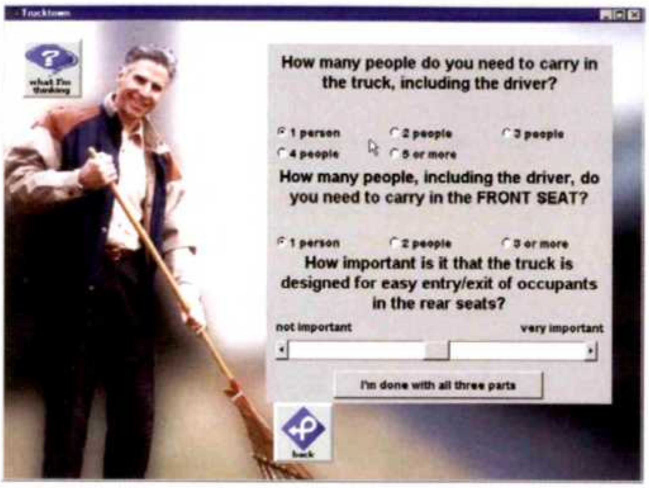
FIGURE 1
Example Question Banks Asked by Bayesian Virtual Adviser

A: Introductory Screen



I understand you are looking for a truck. I'm going to ask you a series of questions. Please take your time to complete the dialog, so that I can recommend trucks that are most suitable for you.

B: Example Question Bank



How many people do you need to carry in the truck, including the driver?

● 1 person ○ 2 people ○ 3 people
○ 4 people ○ 5 or more

How many people, including the driver, do you need to carry in the FRONT SEAT?

● 1 person ○ 2 people ○ 3 or more

How important is it that the truck is designed for easy entry/exit of occupants in the rear seats?

not important … very important

$$
\text{(3)}\qquad EI(q \mid R_{q-1}) = \sum_{j=1}^{V} P(v_j \mid R_{q-1}) \sum_{r_q=1}^{n_q} P(r_q \mid v_j, R_{q-1}) \times \log \frac{P(v_j \mid r_q, R_{q-1})}{P(v_j \mid R_{q-1})}.
$$

We use a two-step look-ahead algorithm. For each potential question bank and response on Step 1, the adviser computes the best second question bank and the expected information for that question bank. It then selects the Step 1 question bank with the highest contingent expected information.

Initial Calibration

Two estimates are necessary and sufficient for the virtual adviser: prior probabilities, $P(v_j)$, and conditional response probabilities, $P(r_q|v_j)$. The virtual adviser obtains the prior probabilities for each individual from a logit model based on five truck characteristics: price, fuel economy, performance, reliability, and safety. Each customer is asked initial constant-sum, self-explicated importance weights (w_c) for these characteristics. (The prior weights are obtained from questions that are asked before the question banks illustrated in Figure 2.) We estimated the prior probabilities with Equation 4, where w_c is the importance for the cth characteristic, x_{jc} is the value of characteristic c for vehicle v_j, and β is a scaling parameter:

$$
\text{(4)}\qquad P(v_j) = \frac{e^{\beta \sum_{c=1}^{5} w_c x_{jc}}}{\sum_{j=1}^{V} e^{\beta \sum_{c=1}^{5} w_c x_{jc}}}.
$$

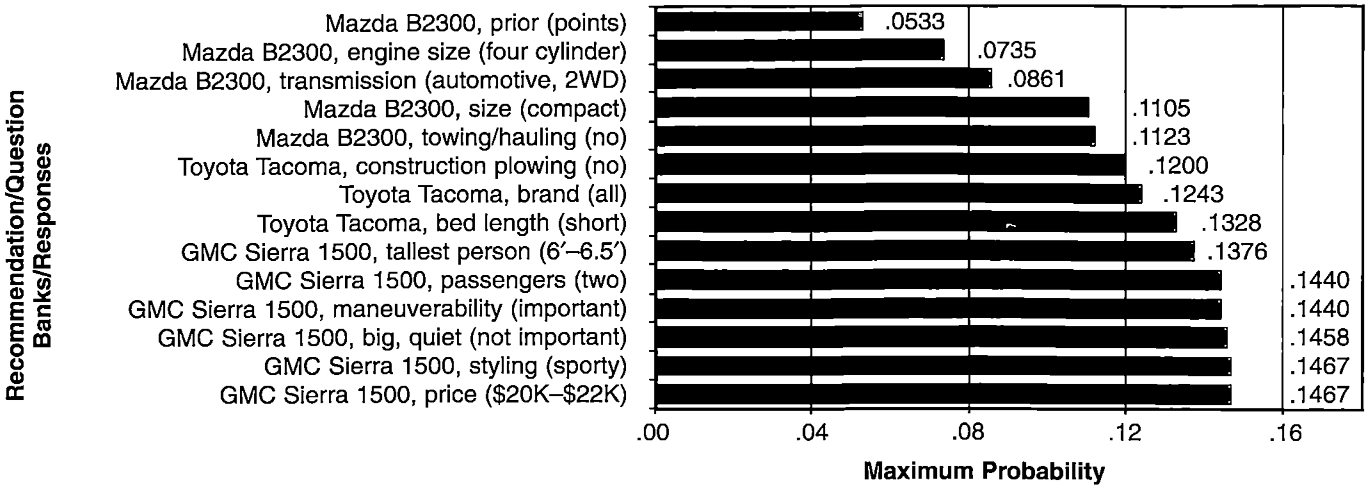
We obtained the characteristic values for each existing vehicle and the scaling parameters from archival data and managers' and engineers' judgments. For example, prior surveys of owners help establish that the Toyota Tacoma 4 × 4 (regular cab) has a rating of 1.087 on fuel economy and a rating of 1.241 on performance. For the GMC Sonoma two-wheel-drive regular cab, the corresponding ratings are 2.116 and .525, respectively (data are disguised slightly). We synthesized the actual data from "an ongoing global effort" by the manufacturer "to understand consumers' needs and wants related to motor vehicles" (quotes from a proprietary study). Part of this ongoing global effort included data from the AIO questionnaire described previously (76 personal viewpoints and 38 vehicle characteristics). When new vehicles become available, managers and engineers provide temporary estimates of the x_{jc}'s.

The conditional response probabilities are based on the ongoing AIO surveys, supplemented when necessary by experienced managers and engineers. For example, the survey data suggest that customers who prefer the Toyota Tacoma 4 × 4 (regular cab) are likely to answer that they prefer a four-wheel-drive vehicle 84% of the time. They are likely to answer that they prefer two-wheel drive only 16% of the time. Table 2 illustrates data, disguised slightly, on conditional probabilities for numbers of passengers that are obtained from AIO studies. The data, $P(r_q|v_j)$, are sufficient for the updating equations (Equations 2 and 3) if they are available for all question banks in the virtual adviser.

Evolving Question Banks

Virtual advisers and listening-in are not one-shot studies. Markets evolve as customer needs change and as technology improves. Each year brings changing features and new truck brands. To advise customers and identify new opportunities effectively, it must be relatively simple to update the prior and conditional probabilities with data from multiple sources. For example, suppose that four-wheel steering becomes a feature that is important to customers (and a feature that helps the adviser recommend a truck). Suppose further that some truck brands begin offering this feature for the 2003 model year. We add a question bank on steering to the set of available trucks. Because of the local independence property, we need obtain only incremental data for the new question banks. We need to know how owners of each

FIGURE 2
Evolution of Updated Recommendation Probabilities After Question Banks



Notes: Abbreviated consumer responses to question bank are in parentheses. 2WD = two-wheel drive.

TABLE 2
Conditional Probabilities Obtained from AIO Surveys and Supplemented with Judgment

	Conditional Probability $P(r_q \mid v_j)$ (%)				
Number of Passengers	**Chevy Avalanche 2WD**	**Chevy Silverado 2500 2WD**	**GMC Sonoma 4WD Crew Cab**	**(148 Vehicles)**	**Dodge Ram Club 4WD**
1	5%	25%	15%	...	10%
2	15	25	5	...	15
3	25	25	15	...	25
4	25	15	25	...	25
5–6	30	10	25	...	25

Notes: Data are disguised. 2WD = two-wheel drive; 4WD = four-wheel drive.

truck brand will rate *their* vehicles on the new question bank. For new truck brands, we need to know how owners of the new brands will rate their vehicles on the characteristic values (x_{jc}) and how they will answer each question bank, $P(r_q|v_j)$. We obtained the data from the periodic AIO surveys and from other sources, such as one-time surveys and judgment. In essence, the virtual adviser (and listening in) free rides on surveys undertaken by the manufacturer for other purposes. This adaptability is a key feature that is necessary for practical application and represents a conceptual difference between the Bayesian virtual adviser and TI. The former uses Bayesian methods to incorporate new data from multiple sources, whereas the latter relies on maximum-likelihood estimates obtained in a calibration survey. Each method is matched to its application domain. However, further research might combine these relative strengths into an improved methodology.

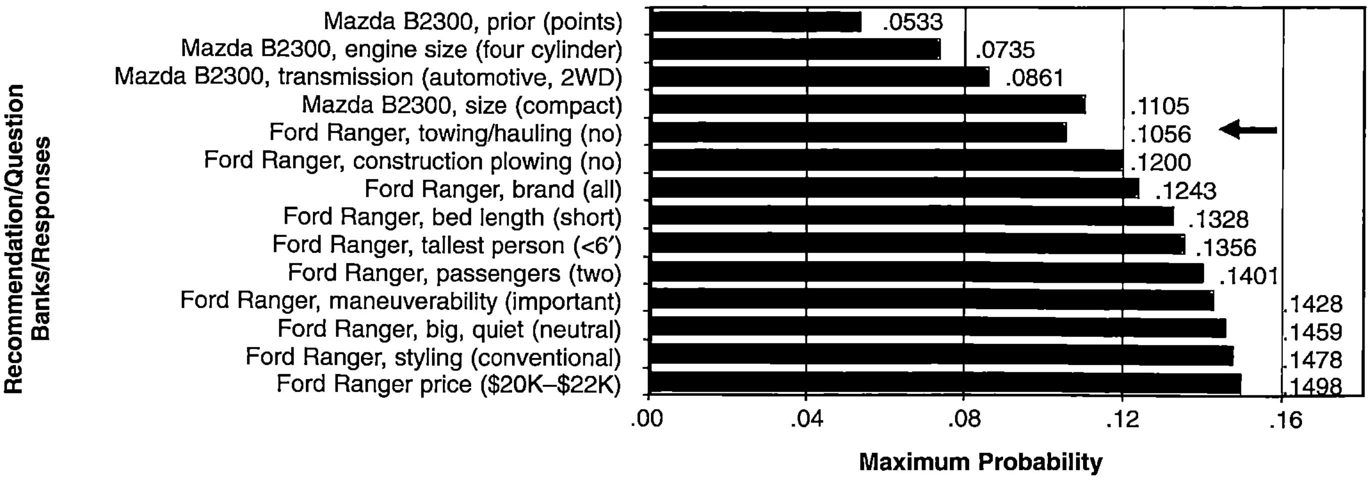
Opportunity Trigger Mechanism

The next stages of listening in identify when opportunities exist and identify the combinations of customer needs that are not satisfied by existing vehicles.

Trigger Mechanism to Identify When Opportunities Exist

For many customers, an existing vehicle will fulfill their needs, and the updated recommendation probabilities will evolve smoothly as in Figure 2. Existing vehicles satisfy the needs combinations these customers desire. However, for some customers, their answers to question banks reveal inconsistencies. For example, suppose that (1) the customer has already answered constant-sum importance question banks, which indicate that reliability and low price are important (price 30 points, performance 10 points, fuel economy 20 points, reliability 30 points, and safety 10 points), and (2) the customer's subsequent answers suggest an interest in a small truck with a four-cylinder engine, two-wheel drive, and automatic transmission. Through the first four question banks, the Mazda B2300 fits these preferences best (see Figure 3, first four bars from top). Given these answers, the virtual adviser decides that further information on towing and hauling will clarify recommendations. The adviser expects that the customer will want to haul or tow relatively light loads, such as small garden equipment or a Jet Ski. Knowing the exact towing and hauling needs will

FIGURE 3
Example Use of the Opportunity Trigger



Notes: Abbreviated consumer responses to question bank are in parentheses. 2WD = two-wheel drive.

help the adviser decide among several otherwise comparable light-duty trucks.

However, suppose that the customer says that he or she plans to use the truck to haul heavy materials and to tow a large motorboat (weighing 6500 pounds). No existing light-duty truck can tow such heavy loads effectively and safely. In contrast, no truck that can tow such heavy loads can fill the customer's requirements as expressed in previous question banks. If enough customers desire these combinations of features, this may be an opportunity worth investigating: a light-duty truck that can occasionally haul heavy materials or tow heavy loads. Note that the goal is to define the opportunity by needs (light duty, haul heavy materials) rather than features (V8 engine). In this way, new vehicles can satisfy the newly identified combinations of customer needs with features that may or may not be available in existing vehicles.

The intuition in this example is that the question bank on towing and hauling revealed something about the customer's underlying needs. This new information suggests that the customer is not satisfied with the needs combinations provided by existing trucks; the virtual adviser will need to revise its best-truck recommendation probability downward. This drop in the maximum recommendation probability becomes a trigger for further investigation. We illustrate this trigger mechanism with an arrow in the dialogue in Figure 3. The fifth question bank, which included questions about towing and hauling, causes the most preferred vehicle to change from the Mazda to a Ford Ranger (a slightly larger, more powerful compact truck). Utility drops because this more powerful compact truck is an insufficient compromise to meet both the towing and hauling requirements and the requirements expressed in the first four question banks (it has a six-cylinder engine and is more expensive). A full-sized truck, such as the Chevrolet Silverado 1500, can fulfill the towing and hauling requirements, but the adviser does not recommend the Silverado because it has poor ratings on the other desired features. After further question banks, the recommendation probabilities in Figure 3 again increase because the Ford Ranger fulfills the additional requirements.

The intuitive idea in Figure 3 has appeal, but before we incorporate the trigger mechanism, we must investigate it further. For example, the posterior probability might drop because there is error in the customer's response. If the trigger mechanism is too sensitive, it might identify many false need-conflicts, and the true need-conflicts might be lost in the noise. In contrast, if it is not sensitive enough, the trigger mechanism might miss opportunities. We show subsequently, through simulation, how to select a sensitivity level for the trigger mechanism such that segments of customers desiring known combinations of needs are recovered with sufficient precision. In the simulations, we begin with real data for the conditional probabilities and create known segments. We then add error and examine how various sensitivity levels balance false positives and false negatives. The simulations demonstrate that calibration is feasible and that the performance of the listening-in mechanism is reasonably robust in the face of response errors. It is also reasonably robust with respect to the sensitivity levels chosen for the trigger mechanism. Having thus established a reasonable degree of internal validity, we are more confident in applying the methodology to real data.

The other issue is theoretical. The intuition assumes that a drop in posterior probability identifies a conflict in the desired customer needs that are fulfilled by existing vehicles. If a question bank affected only the vehicle that was recommended before the qth question bank and if that same vehicle were recommended after the qth question bank, then most random utility models would suggest that a probability drop was an indicator of an underlying utility drop. For example, both the logit and the probit models have this property. However, each question bank can affect the probabilities of all 148 vehicles and change the identity of the recommended vehicle on the basis of the qth question bank. We demonstrate formally in the Appendix that the intuition still holds. If the qth question bank does not change the identity of the recommended vehicle, a drop in posterior probability is a necessary and sufficient condition indicating that the recommended vehicle has characteristics in conflict with the customer's preferences. The more complex issue is when the qth question bank changes the identity of the recommended vehicle. We show formally that if the recommended vehicle changes and the posterior probability drops, it must be the case that a truck with mixed characteristics would have higher utility than the truck recommended either before or after the qth question bank. We also show that the mixed-characteristic truck that is better for the customer is not an existing truck.

Analyses to Identify Which Combinations of Customer Needs Are Not Satisfied

When a probability drop identifies a potential conflict, we seek further information to identify which customer needs are in conflict. We consider a null hypothesis that the existing trucks satisfy (almost all) customer-needs combinations. This hypothesis implies that if two truck characteristics are positively correlated among existing trucks, we expect them to be positively correlated among customers' preferences, as revealed by their answers to the questions banks. For example, on the basis of existing trucks, we expect that there is a positive correlation across vehicles of the probabilities that a customer will (1) use the truck for towing heavy loads and (2) prefer a rugged body style for that vehicle. In addition, we expect that there is a negative correlation of the probabilities that a customer will (1) use the truck for towing heavy loads and (2) prefer a compact body style. Because no existing truck satisfies these needs simultaneously, recommendation probabilities will drop when the customer requests a compact truck that can tow heavy loads (see the Appendix).

This means that we can identify the needs combinations that caused the drop by examining negative correlations among expected answers to the question banks for the questions answered by customers who experienced a probability drop. The probability drop challenges the null hypothesis and its implications. That is, customers who experience a probability drop want some combinations of customer needs that are negatively correlated in the existing market. To find the desired combinations from the set of all negatively correlated combinations, we limit our search to the need combinations evaluated by customers with probability drops.

Formally, $\rho_{r_q r_p}$ is the correlation across vehicles of the conditional probabilities of a customer answering r_q to question bank q and answering r_p to question bank p,[6] and P is the matrix of these correlations (here P is a capital ρ). Whenever a probability drop implies a potential opportunity, the listening-in algorithm examines all correlations corresponding to that customer's answers to the first q question banks ($R_{q-1} \cup r_q$) and flags the ones that are highly negative (less than –.30 in our application). Such negative correlations indicate why the (triggered) customer's desired benefits (needs) are not fulfilled by existing trucks (subject to statistical confidence). The level of the flagging mechanism is set with simulation.

The opportunity trigger identifies the customers who have combinations of needs that are not satisfied, and it flags specific entries in the P matrix to identify combinations of needs that represent new opportunities. The combinations of needs are a working hypothesis for a new opportunity. However, before the automotive firm can act on the working hypothesis, it needs further information about the potential opportunity, because the number of questions the virtual adviser uses is, by necessity, a compromise between efficient recommendation (fewer questions) and probes for new needs combinations (more questions). To understand and explore the opportunity more completely, listening in complements the virtual adviser and the trigger mechanism.

A Virtual Engineer Clarifies the Opportunity

The virtual engineer (VE) concentrates its questions to obtain relevant, more-detailed information about combinations of customer needs. The VE asks relatively few questions of each targeted customer (six screens in our application), but across many customers, its questions span the needs space. In our application, the VE explores an additional 79 features beyond the 36 features explored in the virtual adviser. As is the virtual adviser, the VE is designed to be flexible; its questions are updated continuously without the need to recommission large-scale AIO surveys.

The concept of a VE is simple; its implementation difficult. To be useful, the VE must ask the customer questions that inform the engineering design decisions that are necessary to design a truck to meet the customers' newly identified (potential) combination of needs. To be credible to the customer, the VE must ask questions in a nontechnical manner that pertains to how the customer uses the truck. Naturally, the VE evolves through application, but we describe here the process by which the initial VE questions are created.

An engineering design team from a major automotive manufacturer considered the basic engineering problem imposed by potential conflicting needs. The team then generated the questions that it would need answered to clarify the opportunity and to decide among basic solutions to conflicts. The engineering team members formulated the questions that they would ask the customer if they were participating in the dialogue between the adviser and customer. For example, if a customer wants a compact truck that can tow a large boat, the engineering team would ask about the type of boat (e.g., modest sailboat, large motorboat, multiple Jet Skis) and the weight of the boat that the customer plans to tow. The engineering team would also ask the customer why he or she wants a compact truck (e.g., low price, tight parking, high maneuverability, fuel economy). All engineering questions are then rephrased into "customer language."

In addition to the questions identified by the engineering team, the VE includes open-ended dialogues that enable the customer to elaborate further the reasons underlying the previously unidentified combinations of needs. Figure 4 illustrates a sample dialogue in which the VE introduces himself, asks about a conflict, gathers quantitative data, and asks for open-ended comments. In this example, the conflict is between a full-sized truck and a six-cylinder engine.

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[6] Such correlations *across* vehicles are consistent with local independence, which assumes response independence conditioned on a given vehicle. Local independence enables customers to be heterogeneous across vehicles in their answers to the question banks.

A Design Palette Solicits Customer Solutions to Potential Conflicts

We supplement the VE with a design palette (DP) that covers 14 features. The DP's perspective is the customer's own solutions (von Hippel 1986). The DP is similar to innovation toolkits, configurators, and choice boards that enable customers to mix and match features (Dahan and Hauser 2002; Hauser and Toubia 2003; Liechty, Ramaswamy, and Cohen 2001; von Hippel 2001).

The DP is illustrated in Figure 5. The customer (1) receives instructions, (2) changes the size of the truck, and (3) changes the color. For brevity, we do not show the many intermediate steps, some of which include new state-of-the-art truck features, such as four-wheel steering and extrawide frames. However, changes are not free for the customer. There are sophisticated engineering and cost models underlying the DP. For example, if the customer changes the size of the truck, the price, fuel economy, and towing/payload capacity change accordingly. After completing the redesign, the customer is given the opportunity to indicate whether and by how much he or she prefers the new design. (The customer may not prefer the new design because of accumulated sticker shock or because of a holistic judgment of the final truck.) In the empirical application that we describe subsequently, 73% of the respondents who completed the exercise indicated that they would purchase their custom-designed truck were it available.[7]

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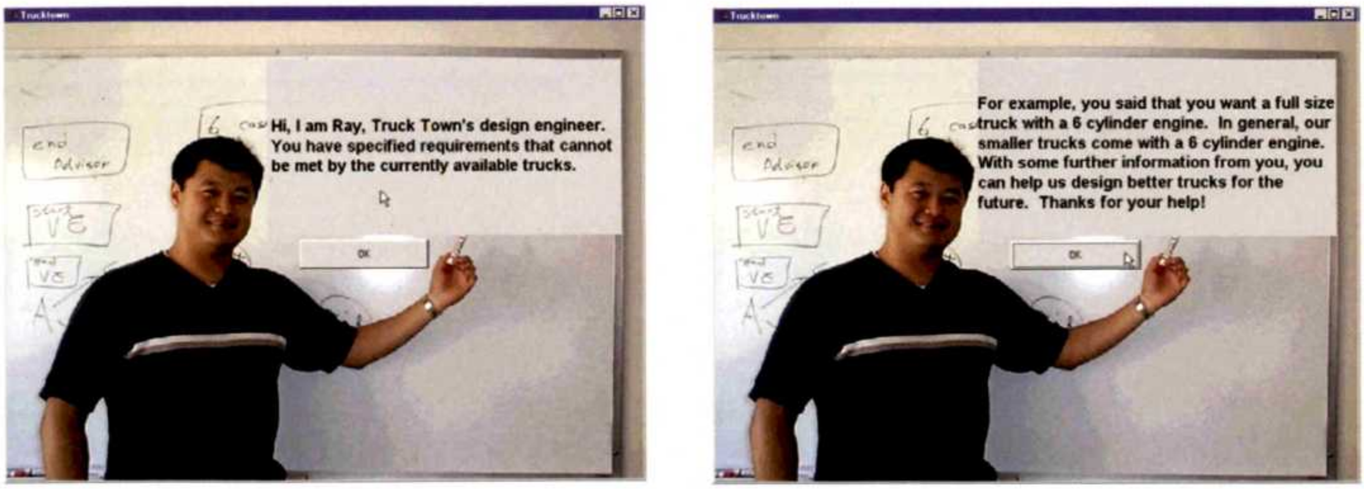
[7] Becuase of self-preference learning, memory accessibility, and context effects, the preference for the self-designed truck may be inflated (Simmons, Bickart, and Lynch 1993; Tourangeau, Rips, and Rasinski 2000). This does not diminish the value of the DP as a means to clarify opportunities.

FIGURE 4
Virtual Engineer



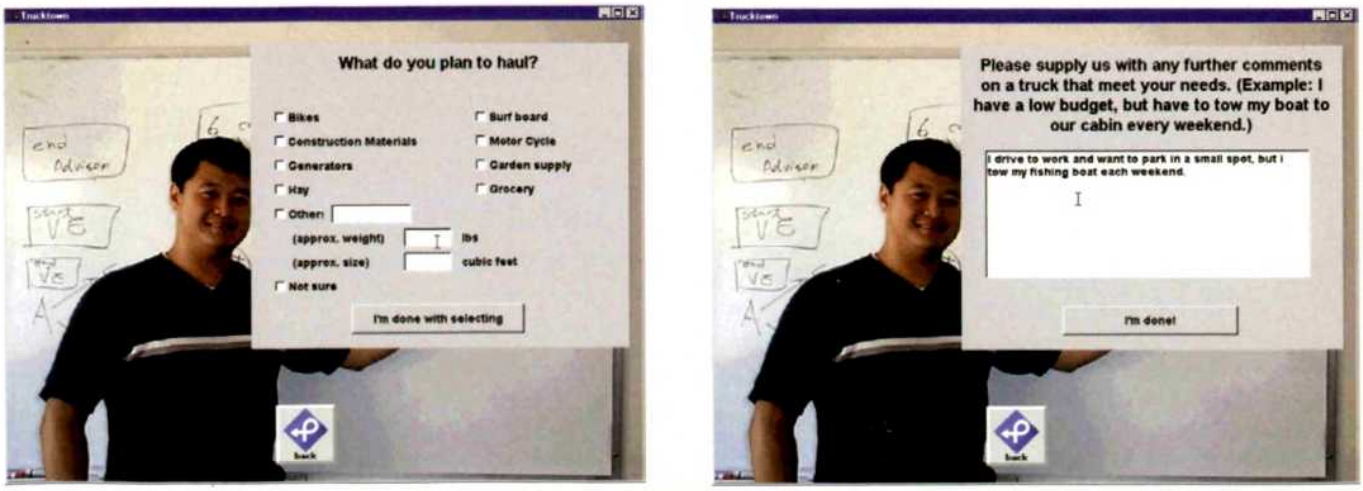
A: Introductory Screen

Hi, I am Ray, Truck Town's design engineer. You have specified requirements that cannot be met by the currently available trucks.

B: Example Dialogue

For example, you said that you want a full size truck with a 6 cylinder engine. In general, our smaller trucks come with a 6 cylinder engine. With some further information from you, you can help us design better trucks for the future. Thanks for your help!

C: Specific Questions to Elaborate



What do you plan to haul?

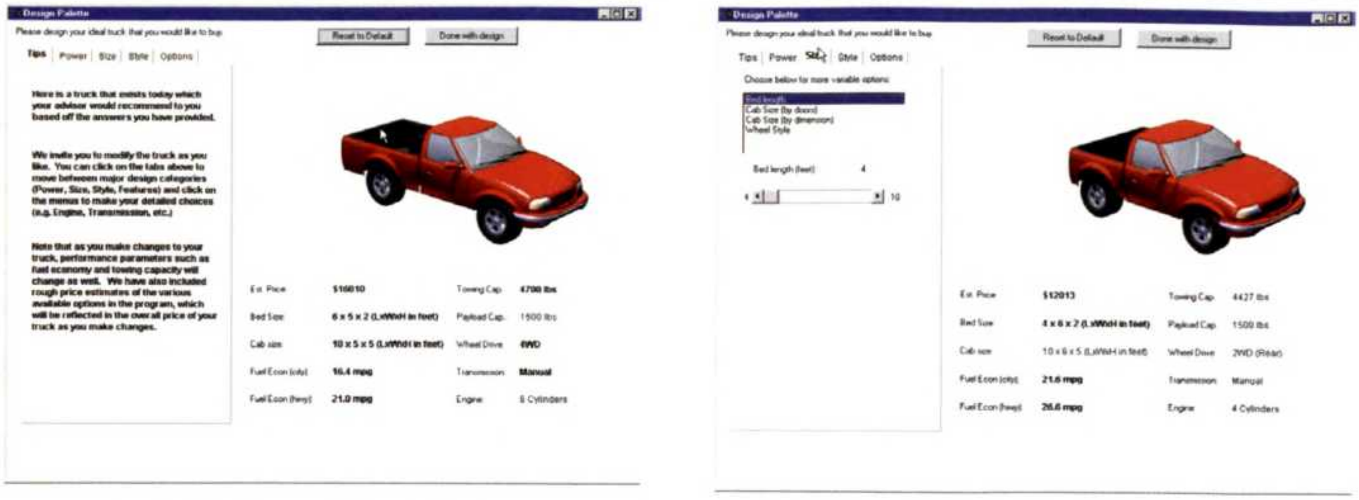
☐ Bikes
☐ Construction Materials
☐ Generators
☐ Hay
☐ Other:
(approx. weight) lbs
(approx. size) cubic feet
☐ Not sure
☐ Surf board
☐ Motor Cycle
☐ Garden supply
☐ Grocery

D: Open-Ended Question

Please supply us with any further comments on a truck that meet your needs. (Example: I have a low budget, but have to tow my boat to our cabin every weekend.)

I drive to work and want to park in a small spot, but i tow my fishing boat each weekend.

FIGURE 5
Design Palette



A: Introductory Screen

Please design your ideal truck that you would like to buy

Here is a truck that exists today which your advisor would recommend to you based off the answers you have provided.

We invite you to modify the truck as you like. You can click on the tabs above to move between major design categories (Power, Size, Style, Features) and click on the menus to make your detailed choices (e.g. Engine, Transmission, etc.)

Note that as you make changes to your truck, performance parameters such as fuel economy and towing capacity will change as well. We have also included rough price estimates of the various available options in the program, which will be reflected in the overall price of your truck as you make changes.

Est. Price	$16010	Towing Cap.	4700 lbs
Bed Size	6 x 5 x 2 (LxWxH in feet)	Payload Cap.	1500 lbs
Cab size	10 x 5 x 5 (LxWxH in feet)	Wheel Drive	4WD
Fuel Econ (city)	16.4 mpg	Transmission	Manual
Fuel Econ (hwy)	21.0 mpg	Engine	6 Cylinders

B: Customer Selects Size

Please design your ideal truck that you would like to buy

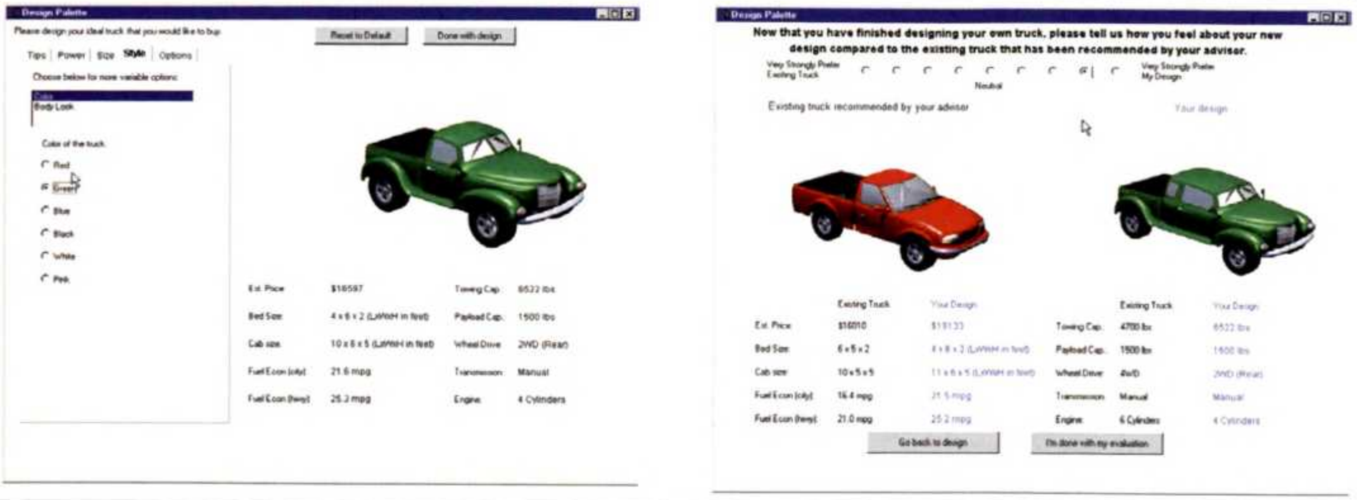
Choose below for more variable options:

- Bed length
- Cab Size (by doors)
- Cab Size (by dimension)
- Wheel Style

Bed length (feet) 4

4 10

Est. Price	$12013	Towing Cap.	4427 lbs
Bed Size	4 x 6 x 2 (LxWxH in feet)	Payload Cap.	1500 lbs
Cab size	10 x 6 x 5 (LxWxH in feet)	Wheel Drive	2WD (Rear)
Fuel Econ (city)	21.6 mpg	Transmission	Manual
Fuel Econ (hwy)	26.6 mpg	Engine	4 Cylinders


Design Palette
Reset to Default
Done with design
Tips | Power | Size | Style | Options
Go back to design
I'm done with my evaluation

C: Customer Selects Color

Please design your ideal truck that you would like to buy

Choose below for more variable options:

- Color
- Body Look

Color of the truck

○ Red
● Green
○ Blue
○ Black
○ White
○ Pink

Est. Price	$16597	Towing Cap.	6522 lbs
Bed Size	4 x 6 x 2 (LxWxH in feet)	Payload Cap.	1500 lbs
Cab size	10 x 6 x 5 (LxWxH in feet)	Wheel Drive	2WD (Rear)
Fuel Econ (city)	21.6 mpg	Transmission	Manual
Fuel Econ (hwy)	25.2 mpg	Engine	4 Cylinders

D: Customer Evaluates His or Her Design

Now that you have finished designing your own truck, please tell us how you feel about your new design compared to the existing truck that has been recommended by your advisor.

Very Strongly Prefer Existing Truck ○ ○ ○ ○ ○ ○ ○ ● ○ Very Strongly Prefer My Design

Neutral

Existing truck recommended by your advisor

Your design

	Existing Truck	Your Design		Existing Truck	Your Design
Est. Price	$16010	$19133	Towing Cap.	4700 lbs	6522 lbs
Bed Size	6 x 5 x 2	4 x 8 x 2 (LxWxH in feet)	Payload Cap.	1500 lbs	1500 lbs
Cab size	10 x 5 x 5	11 x 6 x 5 (LxWxH in feet)	Wheel Drive	4WD	2WD (Rear)
Fuel Econ (city)	16.4 mpg	21.5 mpg	Transmission	Manual	Manual
Fuel Econ (hwy)	21.0 mpg	25.2 mpg	Engine	6 Cylinders	4 Cylinders

In general, DPs are evolving rapidly. For example, there is a system that enables the customer to adjust the length of the hood of a car or truck while the software automatically ensures the integrity of other design elements, such as the windshield angle and window shape. The customer simply clicks on the hood and drags it forward or clicks on the front bumper and pushes it back. Using this advanced DP, the customer easily creates a "Euro" sports design (short front overhang, high truck deck, low overall height) that is pleasing to the eye and incorporates many design heuristics. In contrast, by lengthening the front overhang and the hood the customer creates a classic look with a long sloping back to the truck. The software is sufficiently advanced that the customer can then rotate the model in all directions for a full three-dimensional view.

Together, the virtual adviser, VE, and DP explore 129 customer needs (10^{52} combinations, many of which are multilevel). The detailed data help the firm understand the customer-need conflicts that led some customers to experience a probability drop. The philosophy behind this listening-in search differs from conjoint analysis. Conjoint analysis collects data on the importance of customer needs and searches to find needs combinations that satisfy a minimum share of the market profitably. In contrast, listening in monitors needs requests to identify when customers request combinations of needs that are not fulfilled by existing trucks. After the opportunities are identified, they can be explored further with conjoint analysis.

Initial Sizing of the Opportunity

The next stage of listening in groups customers according to their unmet combinations of needs as revealed through flagging components of the P matrix (supplemented with the VE and DP for interpretation). This estimate of market potential is a rough indicator, but it is sufficient to identify potential opportunities for the fuzzy front end of an iterative product development process. The firm evaluates the opportunities further with targeted qualitative and quantitative research.

Suppose that A_i represents customer i's answers to the question banks. For each A_i, we identify a subset, P_i, of the P matrix that represents strongly negative correlations. By clustering *triggered* respondents on P_i, we identify groups of customers with similar combinations of desired needs that are not fulfilled (on average) by existing trucks. Subject to the caveat of self-selected customers, the size of the cluster as a fraction of the initial sample is a rough indicator of the size of the segment that desires the identified combinations of needs.[8] To simulate a new truck design, we define a concept truck by the needs it fulfills as reflected by customers' answers to the question banks, $P(r_q|v_j)$. These data are sufficient to calculate revised posterior probabilities for all trucks, including the new-truck concept (Equation 2). Averaging of the revised posterior probabilities over respondents provides a rough estimate of the potential market share for the new concept truck.

Monte Carlo Simulations: Sensitivity to Error and the Trigger Mechanism

If successful, listening in will affect billion-dollar decisions on new truck platforms. Before we can be confident in its application, we must address the following issues: First, we want to know whether listening in can recover opportunities from noisy data. This issue is best addressed with simulation because we can specify known segments of customers who have unmet needs combinations. Second, applications require that the opportunity trigger be calibrated. Here, too, simulation is best to determine the best trigger sensitivity. Relevance and external validity are better addressed with a proof-of-concept application in which we listen in to real customers in a pilot study to determine whether unmet combinations of needs can be identified. We hope that the pilot study at least can identify combinations of needs that were discovered in parallel by other studies (at much greater expense). Recall that truck manufacturers routinely spend tens of millions of dollars annually on market research.

Simulation Methodology

We use the conditional probabilities, $P(r_q|v_j)$, and P-matrix correlations based on the 100,000-respondent AIO study and supplemental managerial judgment. On the basis of the proof-of-concept study we describe subsequently, we select three segments of customers whose needs are satisfied by existing trucks (e.g., full-sized trucks that can tow and haul large loads). The three segments provide a baseline from which to test whether the methodology identifies false opportunities. Next, we generate six segments with combinations of needs that are not satisfied by existing trucks. We define their responses to the question banks to be consistent with their desired benefits (needs). We attempt to test whether listening in can recover these segments from noisy data. Because of the multiple stages of listening in, this is far from ensured. In total, we generate nine customer segments of 500 respondents each, for a total of 4500 simulated respondents.

We next add errors to the customers' responses. For the r_q's, which are nominal variables, we randomly select E% of the questions to be answered incorrectly. The incorrect answers are distributed among the remaining categories according to a uniform distribution. For the w_c's, which are interval-scaled variables (mean = 20), we simulate response error by adding a zero-mean, normally distributed response error such that the standard deviation of the error equals a specified number of points (e). For simplicity, we truncate negative self-explicated importances that, fortunately, occur with low probability. We then apply the listening-in equations to each of the 4500 simulated respondents. For clustering the P matrix, we use a k-means nontree clustering algorithm based on the Euclidean norm defined on the matrix of negative correlations from triggered respondents (respondents by potential conflict pairs; details are available on request).

Internal Validity: Testing Recovery of Unmet Needs Combinations from Noisy Data

As an initial test of internal validity, we add moderate noise where e = 5 points and E = 10%. We use a relatively sensitive opportunity trigger; we record conflict correlations whenever $P(v_1|r_q, R_{q-1}) - P(v_1|R_{q-1}) \leq .00005$. We subsequently examine sensitivity to this parameter.

Table 3 suggests that listening in can recover known needs combinations from moderately noisy data. The entries indicate the number of respondents from a true segment (rows) that were assigned to a cluster (columns). We examine Table 3 at the macro and micro levels.

The managerial focus is at the macro level. First, we notice the diagonal nature of the data in Table 3; even with noise in the data, listening in identified all five segments. Second, we examine the unmet combinations of needs that defined each segment. For example, the first known segment was defined by four need conflicts: compact truck/tow large loads, compact truck/haul large loads, four-cylinder engine/tow large loads, and a four-cylinder engine/haul large loads. In Cluster 1, the percentages of respondents who had these needs were 95.9%, 82.4%, 77.3%, and 73.3%, respectively. We identified no other need conflict for more than 9.4% of the Cluster 1 respondents. We obtained similar results for the other five known clusters. We identified no false-positive needs combinations at the macro level (Clusters 8 and 9 are redundant with Cluster 6).

At the micro level, we classified 82.7% of the respondents correctly. Most of the misclassifications were respondents who were classified falsely into the null segment because of errors in their responses. The simulation identified 21,096 conflict pairs compared with only 16,500 true conflict pairs: 14% were false negatives, and 36% were false positives. Thus, response errors affect the classification of specific respondents. Fortunately, the macro-level identification of unmet needs combinations appears robust with respect to the micro errors. We now test whether this insight generalizes to other levels of errors (e and E) and other sensitivities of the opportunity trigger.

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[8] There is self-selection because customers choose to initiate dialogues with virtual advisers. Nonetheless, a large fraction of self-selected customers might be an important opportunity. We expect less self-selection as more truck customers use the Web to search for information.

Setting the Sensitivity of the Opportunity Trigger and Its Relative Robustness

Table 4 repeats the simulations for various trigger sensitivities (t) that vary from extremely sensitive (t = .00000) to extremely insensitive (t = .10000). At both the macro and micro levels, listening in is relatively robust with respect to the trigger level for t ≤ .001. For larger sensitivities, performance degrades. For extremely high t, all opportunities are missed. On the basis of Table 4 and simulations with other levels of error, we recommend a sensitive trigger. The exact level is less critical as long as the level is less than .001.

Sensitivity to the Level of Response Errors

We now explore the sensitivity of listening in to response errors in the constant-sum question banks (e) and the nominal question banks (E). We examine performance at both the macro level (percentage of needs combinations identified) and the micro level (percentage of respondents classified correctly). Table 5 suggests that performance is relatively insensitive to errors in the priors (w_c's), even for errors that are 50% of the mean response (ten points). For a Bayesian system, we did not find this surprising; the impact of the priors diminishes as more question banks are answered. However, performance is sensitive to errors in the nominal question banks, with clear degradation at a 20% error. Such an error rate would correspond to one of five respondents saying that they want a compact truck when they actually want a large truck. Table 5 indicates that care must be taken in Web design to engage customers with clear questions so that error rates (E) remain at 10% or lower.[9]

Summary

Together, Tables 3, 4, and 5 suggest that a reasonable level of internal validity exists despite errors in both the prior preferences and the responses to the question banks. As long as the trigger level is relatively sensitive (≤.001) and the nominal error is moderate (≤10%), listening in can identify known segments of customers who desire combinations of needs that existing trucks do not meet. Recovery is not perfect when there are response errors, but this level of recovery should be sufficient for the fuzzy front end of product development, especially when final managerial decisions are refined with subsequent qualitative and quantitative data.

Proof-of-Concept Application and Test

Before bringing online listening in to a situation in which more than 350,000 customers are tracked annually, we believed it was important to test the methodology in a pilot

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[9] There appears to be a slight anomaly in Table 5. For E = 20%, classification and identification appear to increase slightly with errors in the self-explicated importance. This happens because the combination of errors pushes more respondents to the no-conflict clusters. As a result, a few more no-conflict respondents are classified correctly, making it easier to achieve a majority in the remaining clusters. Neither difference is significant at the .05 level with a two-tailed t-test.

TABLE 3
Results of the Simulated Cluster Analysis

	Number of Respondents Classified to Each Cluster									
Needs Combinations	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Compact truck, large loads	**418**	0	0	1	0	0	81	0	0	500
Sporty full-sized, short bed	1	**422**	0	0	0	0	77	0	0	500
Compact truck, diesel	0	0	**401**	0	0	0	99	0	0	500
Full-sized, extrashort bed	1	0	0	**346**	0	0	153	0	0	500
Compact truck, ten cylinders	3	27	0	0	**336**	0	134	0	0	500
Full-sized, maneuverable	0	2	0	0	0	**346**	92	43	17	500
Null segment	43	0	2	1	0	0	**1454**	0	0	1500

Notes: Each known segment desired multiple needs combinations. Here, we list examples for each segment. The largest number in each row is in boldface.

TABLE 4
Calibrating the Opportunity Trigger

Trigger Level	**Percentage of Respondents Classified Correctly**	**Percentage of Opportunities Identified Correctly**	**Percentage of Needs-Combinations Segments Identified**	**False Opportunities Identified**
t = .00000	82.73	100	100	0
t = .00005	82.73	100	100	0
t = .00010	82.69	100	100	0
t = .00100	82.69	100	100	0
t = .01000	56.69	63.6	63.4	0
t = .10000	33.33	0	0	0

TABLE 5
Sensitivity to Response Errors

Response Errors (Updating)	Errors in the Self-Explicated Importance (Priors)		
	e = 0 Points	e = 5 Points	e = 10 Points
Macro Level Percentage of Unmet Needs Combinations Identified Correctly			
E = 0%	100%	100%	100%
E = 10%	100%	100%	100%
E = 20%	93 9%	75 8%	81 8%
Micro Level· Percentage of Respondents Classified Correctly			
E = 0%	100%	99 9%	99 9%
E = 10%	82 9%	82 7%	81 8%
E = 20%	61 6%	55 0%	56 8%

test with real customers In August 2001, an automotive manufacturer sponsored a study in which 1092 pickup-truck customers were recruited from the Harris Interactive Panel and given a $20 incentive to participate in the test[10] On average, each customer spent 45 minutes with the virtual adviser, DP, and VE (when triggered) Most customers found the experience worthwhile Customers trusted the virtual adviser by an eight-to-one margin over dealers and would be more likely to purchase a vehicle recommended by the virtual adviser by a four-to-one margin over a vehicle recommended by a dealer For the DP, 78% of participants found using it an enjoyable experience, and 82% believed it was a serious exercise When the VE was triggered, 88% of participants found the questions easy to answer, and 77% believed that the VE related well to their needs Notably, 56% of the participants reported that they would pay for the advice provided by the virtual adviser if it were included in the price of the pickup truck that they purchased as a result of using the adviser

With a sensitive trigger, the most common pairwise conflicts were a maneuverable full-sized truck (38%), a compact truck that could tow and haul heavy materials (14%), and a full-sized truck with a six-cylinder engine (7%) Two segments of customers were identified that expressed unmet combinations of needs Segment 1 requested large trucks but indicated a desire for maneuverability Segment 1 consisted of two groups customers who wanted a top-of-the-line truck and customers who wanted a standard full-sized pickup truck Segment 2 requested a compact truck that could tow and haul heavy loads Table 6 provides more detail on Segment 1 From the VE, we learned that respondents use full-sized trucks for city driving Large trucks fulfill critical needs for large passenger capacity and large payloads However, the respondents also desired maneuverability combinations of benefits (needs) that are not available with existing trucks

The DP explored Segment 1's desires further The features that they changed most often were truck height (6′ to 7′), truck width (6′ to 7′), and steering (two-wheel to four-wheel steering) This suggests that these customers desire an even larger truck but that they would be interested in four-wheel steering to gain maneuverability Using the methods described previously for market sizing, we estimated the potential market share of a full-sized truck with four-wheel steering On the basis of cost models, we calculated that the extra features would increase the manufacturer's suggested retail price by $3,000 For this concept truck, the listening-in equations estimate a market-share increase for the manufacturer of 3%–4% (we coded the exact value for confidentiality)[11] Such a $2 4 billion–$3 2 billion annual opportunity is worth further investigation In addition, a compact truck with heavy-duty hauling and towing is estimated to be a $1 billion–$2 billion opportunity (values are coded) Technically, the benefit (needs) combinations are feasible with the use of a small truck platform that has a strong frame, transmission, and engine

After we completed our study, we learned that an automotive manufacturer was in the process of introducing four-wheel steering to improve the maneuverability of its top-of-the-line pickup truck, which was previously unknown to us This combination of needs had been identified with traditional methods (Table 1) but at a significantly greater cost This truck is now selling well We plan to monitor the sales of this truck to determine whether its sales are in the rough range predicted by the market-sizing equations We found no indication that traditional methods identified the need for a basic truck with four-wheel steering We plan to monitor whether traditional methods confirm such a combination of needs

TABLE 6
Elaboration of Customer Needs for a Full-Sized Maneuverable Pickup Truck

Why I Need a Maneuverable Pickup Truck		Why I Need a Full-Sized Pickup Truck	
Frequent city driving	66%	Large passenger capacity	73%
Tight parking	58%	Large payloads	50%
I make many U-turns	26%	Full-sized style	39%
Too many traffic jams	28%		

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[10] We based this initial test on a stratified random sample of the panel For this test, all customers were given the opportunity to use the DP

[11] We obtain rough forecasts by adding a full-sized maneuverable pickup truck to the choice sets of the needs-segment customers We obtain $P(r_q|v_j)$ for the new vehicle by assuming a profile similar to an existing vehicle except for the critical responses on the size and maneuverability questions, which we changed to be consistent with the vehicle being both full-sized and maneuverable The iterative use of Equation 1 provides the estimates

Summary, Discussion, and Further Research

In this article, we explore a methodology to listen in on customer dialogues with virtual advisers to identify combinations of customer needs that are not fulfilled by existing trucks Monte Carlo analyses suggest that listening in is internally valid and relatively robust with respect to response errors and trigger sensitivity A proof-of-concept demonstration suggests that unmet needs combinations for real respondents can be identified

As with all methodologies, listening in will benefit from continuous improvement Each stage can be improved, better methods to identify priors, more efficient look-ahead algorithms, improved calibration of the trigger mechanism, and better indicators of conflicting needs all can benefit from further research The dialogues, the user interfaces, and the presentation of stimuli are all areas of potential improvement For example, work is now underway to put more stretch into the DP and to give the virtual adviser and the VE personalities based on "talking heads" The various stages of listening in are designed to be modular Further research might explore other advisers, triggering mechanisms, means to identify and size segments (e g , latent structure analysis), and applications (e g , telecommunications, consumer electronics, travel services, financial services)

Appendix

Formal Derivation of Trigger Mechanism

The listening-in methodology uses a trigger mechanism to invoke the VE and DP We argue intuitively in the text that such a drop in the recommendation probability (Equation 1) is an indication that existing trucks do not fulfill desired combinations of customer needs Here, we demonstrate with a formal analytical model that such a drop identifies opportunities The issue is not trivial because a question bank, q, potentially affects the updated utilities of *each and every product* in the market, not just the recommended product The formal analysis identifies the net effects

Although our application uses complex question banks for 148 trucks, we can illustrate the basic principles with N = 3 and a dichotomous question bank (Our propositions generalize to analogs for larger N and for polychotomous question banks, but the notation is cumbersome) Following the text, j indexes the vehicles Without loss of generality, v_1 is the recommended product after question bank q – 1 In addition, $\vec{x}_j$ represents customer benefits (needs) that are not affected by question bank q, and $\vec{y}_j$ represents customer benefits (needs) that are affected by question bank q In this formulation, we treat price as a characteristic, and it can be in either $\vec{x}_j$ or $\vec{y}_j$ (for motivation, see Hauser and Urban 1996) Following Blackorby, Primont, and Russell (1975), we model preferences using a utility tree such that $u(\vec{x}_j, \vec{y}_j) = u_x(\vec{x}_j) + u_y(\vec{y}_j) + \varepsilon$, where ε is a Gumbel-distributed error term that represents the uncertainty in utility due to question banks that have not yet been asked (or may never need to be asked) For simplicity, we assume that trucks with $\vec{y}_j = \vec{y}_{good}$ experience an increase in utility, and trucks with $\vec{y}_j = \vec{y}_{bad}$ experience a decrease in utility (The dichotomous question bank reveals which customer benefits are desired) We let v_2 be a surrogate for products with desirable characteristics and v_3 be a surrogate for products with undesirable characteristics (as revealed by question bank q) Following McFadden (1974), we write the recommendation probabilities in more fundamental utility-theory terms (where V is the total number of vehicles)

$$\text{(A1)} \qquad P(v_j \mid r_q, R_{q-1}) = \frac{e^{u_x(\vec{x}_j)+u_y(\vec{y}_j)}}{\sum_{m=1}^{V} e^{u_x(\vec{x}_m)+u_y(\vec{y}_m)}}$$

$$= \frac{e^{u_x(\vec{x}_j)+u_y(\vec{y}_j)}}{e^{u_x(\vec{x}_1)+u_y(\vec{y}_1)} + e^{u_x(\vec{x}_2)+u_y(\vec{y}_{good})} + e^{u_x(\vec{x}_3)+u_y(\vec{y}_{bad})}}$$

After question bank q, two situations can occur The recommended truck remains v_1 or it becomes v_2 It cannot become v_3, because even if $\vec{y}_1 = \vec{y}_{bad}$, v_1 would still be preferred over v_3 The following propositions address the two situations Together, they indicate that whenever the recommendation probability drops, an opportunity exists for a new higher-utility truck with mixed characteristics

P_1 If the recommended truck after question bank q is the same truck as that recommended after question bank q – 1, then v_1 has undesirable characteristics ($\vec{y}_1 = \vec{y}_{bad}$) if and only if $P(v_1|r_q, R_{q-1})$ decreases If the probability decreases, a new truck with mixed characteristics has higher utility than does the recommended truck That new truck is not currently available in the marketplace

P_2 If the recommended truck after question bank q is different from the truck recommended after question bank q – 1 and if the recommendation probability decreases, then v_1 has undesirable characteristics ($\vec{y}_1 = \vec{y}_{bad}$) A new truck with mixed characteristics has higher utility than both the recommended truck after q – 1 question banks and the recommended truck after q question banks That new truck is not currently available in the marketplace

Proofs

Straightforward algebra establishes that $P(v_1|r_q, R_{q-1}) - P(v_1|R_{q-1})$ is proportional to $e^{u_x(\vec{x}_1)+u_x(\vec{x}_3)+u_y(\vec{y}_{good})} - e^{u_x(\vec{x}_1)+u_x(\vec{x}_3)+u_y(\vec{y}_{bad})} \geq 0$ if $\vec{y}_1 = \vec{y}_{good}$ and that $e^{u_x(\vec{x}_1)+u_x(\vec{x}_2)+u_y(\vec{y}_{bad})} - e^{u_x(\vec{x}_1)+u_x(\vec{x}_2)+u_y(\vec{y}_{good})} \leq 0$ if $\vec{y}_1 = \vec{y}_{bad}$ Algebra also establishes that the proportionality (denominator) is positive This establishes the first statement in P_1 and implies that $\vec{y}_1 = \vec{y}_{bad}$ if the probability drops Because $u_1(\vec{x}_1) + u_y(\vec{y}_{good}) > u_1(\vec{x}_1) + u_y(\vec{y}_{bad})$, a new product with $\vec{x}_1$ and $\vec{y}_{good}$ has higher utility If the recommended truck changes after question bank q, then $P(v_1|r_q, R_{q-1}) < P(v_2|r_q, R_{q-1})$, and because the recommendation probability decreases, we have $P(v_2|r_q, R_{q-1}) < P(v_1|R_{q-1})$ Thus, $P(v_1|r_q, R_{q-1}) < P(v_1|R_{q-1})$, and by P_1, we have $\vec{y}_1 = \vec{y}_{bad}$ This establishes the first result in P_2 Because v_1 was recommended before question bank q, we have $u_x(\vec{x}_1) > u_x(\vec{x}_2)$, by supposition, we have $u_y(\vec{y}_{good}) - u_y(\vec{y}_{bad}) > 0$ Thus, a product with the features $\vec{x}_1$ and $\vec{y}_2$ will have higher utility than either v_1 or v_2 This establishes the second result in P_2 In both propositions, we know that the new truck does not currently exist, because if it were available, it would have higher utility and thus would have been recommended

Generalizations

If there are n_2 trucks similar to v_2 and n_3 trucks similar to v_3, the analogs to P_1 and P_2 are readily proved The numbers n_2 and n_3 enter the equations for $P(v_1|r_q, R_{q-1}) - P(v_1|R_{q-1})$, but the basic proofs remain intact If there are many trucks with $\vec{y}_{good}$ or $\vec{y}_{bad}$ but different $\vec{x}_j$, the expressions for $P(v_1|r_q, R_{q-1}) - P(v_1|R_{q-1})$ include more terms, but each can be proved to have the correct sign (i e , increases if $\vec{y}_{good}$ and decreases if $\vec{y}_{bad}$) With these changes, the remaining portions of the proofs follow as we have showed

We use Equation 1 to make the proofs transparent Both propositions can be generalized to other probability models with the appropriate characteristics We leave the details of these generalizations to readers

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Stefan Wuyts, Shantanu Dutta, & Stefan Stremersch

Portfolios of Interfirm Agreements in Technology-Intensive Markets: Consequences for Innovation and Profitability

Despite the high relevance of firms' portfolios of upstream interfirm agreements in technology-intensive markets, little is known about their impact on innovative success The authors develop a conceptual framework that explains the consequences of different portfolio descriptors for radical innovation, incremental innovation, and profitability An empirical test in the pharmaceutical industry shows strong support for the developed theory

There is a rich tradition in marketing of studying diverse aspects of innovation and new product development (NPD) A broad range of prior marketing studies have identified several drivers of NPD, such as the voice of the customer (Griffin and Hauser 1993), internal knowledge development (Madhaven and Grover 1998, Moorman and Miner 1997), and organizational processes and capabilities (Moorman 1995, Moorman and Slotegraaf 1999, Tatikonda and Montoya-Weiss 2001) Marketing scholars only recently have acknowledged an important additional driver interfirm cooperation (Rindfleisch and Moorman 2001, Sivadas and Dwyer 2000) As Wind and Mahajan (1997, p 7) point out, firms look beyond their boundaries to access knowledge required for NPD "Typically, NPD activities are internally focused Yet, the increased complexity and cost of developing truly innovative products and advances in new technologies often require expertise that the firm does not have, thus, [research-and-development] strategic alliances have emerged"

Especially in technology-intensive (TI) markets, to develop new products, firms need to cooperate with other firms through flexible upstream agreements (Sivadas and Dwyer 2000) However, most recent research has concentrated on interfirm agreements in isolation, with special attention to dyadic information transfer and coordination (Sivadas and Dwyer 2000) and relational embeddedness (Rindfleisch and Moorman 2001) We build on this prior literature and develop a conceptual framework of the nature of knowledge transfer that occurs through portfolios of research-and-development (R&D) agreements rather than through individual isolated agreements The importance of such agreement portfolios for NPD lies in their facilitating role in the access to and transfer of knowledge (Glazer 1991, Powell, Koput, and Smith-Doerr 1996) We focus on upstream R&D agreements, because these are the agreements that reportedly aid in innovation (Sivadas and Dwyer 2000, Wind and Mahajan 1997) Our focus on the entire portfolio of R&D agreements in which a firm is engaged enables us to capture descriptors that cannot be captured by studying agreements in isolation We show that the portfolio descriptors have an important impact on a firm's innovative success

A portfolio approach to interfirm cooperation corresponds with the importance that firms in many TI markets attach to portfolios of R&D agreements (Dutta and Weiss 1997) Industry observers conclude that firm performance in TI markets, such as the pharmaceutical industry, is strongly determined by successful management of entire portfolios of interfirm agreements (e g , Slowinski 2001) For example, Pfizer has assembled a large portfolio of R&D agreements and claims that these efforts will have a positive impact on innovative output (Humphreys 2002) However, a recent article in *McKinsey Quarterly* (Bamford and Ernst 2002) reveals the difficulties that managers face when they try to assess their agreement portfolio's payoff to the firm

We study the effect of portfolio characteristics on both radical and incremental innovation When innovations incorporate a substantially different core technology and provide substantially greater customer benefits than previous products in the industry, we call them "radical" (Chandy and Tellis 1998), when one or both of the conditions are not met, we call them "incremental" We also study the impact of radical and incremental innovation on profitability, and we study whether the portfolio characteristics have addi-

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tional direct effects on profitability In doing so, we account for possible cost and other implications that portfolio characteristics may have on profitability, in addition to their indirect effect through innovation[1]

We present an empirical test in the pharmaceutical industry The test provides strong support for the developed theory but also yields some notable unexpected insights In what follows, we first present the conceptual framework, hypotheses, and methodology We then discuss our findings as well as theoretical and managerial implications We conclude by acknowledging the limitations of our study and proposing several areas for further research

Conceptual Framework and Hypotheses

In many industries, firms form R&D agreements to access knowledge from other firms, which may aid in innovation (Baum, Calabrese, and Silverman 2000, Powell, Koput, and Smith-Doerr 1996, Wind and Mahajan 1997) As such, a firm's portfolio of agreements affects its exposure to external knowledge and its opportunities for the transfer of that knowledge, which in turn affect innovation and profitability

We focus on two specific descriptors of the R&D agreement portfolio the portfolio's technological diversity and the level of repeated partnering *Technological diversity* refers to the extent to which the agreements in a firm's portfolio cover a diverse set of technologies and thus may facilitate the inflow of more-diverse knowledge *Repeated partnering* refers to the extent to which a firm engages in different R&D agreements with the same partners and thus may enable the transfer of more-complex knowledge (i e , facilitate the inflow of knowledge in depth) These two characteristics are important for several reasons First, they are theoretically more interesting than a popular but crude portfolio descriptor that is often mentioned in industry reports, namely, portfolio size Technological diversity and repeated partnering facilitate knowledge transfer along two dimensions that have received considerable attention in prior literature (Dewar and Dutton 1986, Katila and Ahuja 2002) knowledge diversity (see Cohen and Levinthal 1990, Sinkula 1994) and knowledge depth (see Badaracco 1991, Hansen 1999)

Second, experts point to the importance of the agreement portfolio descriptors in TI markets, and in the pharmaceutical industry in particular (Bamford and Ernst 2002, Baum, Calabrese, and Silverman 2000, Gomes-Casseres 1998) Third, the two characteristics are within the managers' reach with respect to both monitoring and managing the portfolio, and thus they may serve as building blocks for a portfolio strategy Fourth, there is substantial variation in the portfolio descriptors among different firms in TI markets For example, there is substantial variation in pharmaceutical firms' portfolios of R&D agreements in terms of both technological diversity (e g , Becton, Dickinson has allied several times on immunoassay technology, but Syntex rarely allies twice on the same technology) and repeated partnering (e g , Sandoz has allied several times with the biotechnology firm SyStemix, but Johnson & Johnson rarely allies twice with the same biotechnology firm)

We propose hypotheses on the effects of technological diversity and repeated partnering on (radical and incremental) innovation, after which we turn to their effects on profitability We conclude this section with an overview of other relevant variables (e g , portfolio size) for which we control

Agreement Portfolios and Innovation

Technological diversity A diverse inflow of knowledge affects innovation because it strengthens assimilative powers and enables novel associations (Cohen and Levinthal 1990) The inflow also stimulates broader perspectives and synthesis (Dewar and Dutton 1986, Fichman and Kemerer 1997) We expect that technological diversity affects both radical and incremental innovation

We first consider radical innovation Radical innovations are built on new (different from the established) technologies (Dewar and Dutton 1986) and often rely on the integration of different technologies (Iansiti and West 1997), thus, access to diverse knowledge bases is important Greater technological diversity may lessen a firm's tendency to capitalize on or to be locked into its prior knowledge, and it may stimulate the firm to experiment with new technologies (Chandy and Tellis 1998) Especially in TI markets, which are characterized by rapid technological change, it is imperative for firms to keep abreast of the latest technological developments (Iansiti and West 1997) In this sense, a technologically diverse agreement portfolio facilitates access to new and nonredundant knowledge bases, which will aid in tracking new scientific discoveries and advances Firms that access highly redundant knowledge bases are less open to and may even be unaware of other new promising technologies (Rowley, Behrens, and Krackhardt 2000) Their restrictive focus on a limited set of technologies makes it increasingly difficult to detect and engage in new promising technologies (Leonard-Barton 1992, Levinthal and March 1993), which may significantly hamper radical innovation in markets that are characterized by rapid technological change (Tushman and Anderson 1986)

In summary, we expect that technological diversity enhances radical innovation It could be argued that a potential drawback of technological diversity is that it may impede a clear focus and complicate the development of specialist competence, which may constrain innovation However, we expect that in TI markets, the positive effects of technological diversity dominate

As for incremental innovation, the mere quantity of incoming information may be more relevant than its novelty Firms can also arrive at incremental innovations without accessing novel information and without integrating different technologies A diverse background provides a more robust basis for learning in TI markets (Iansiti and West 1997), because incoming information more likely is associated with what is already known A more diverse technological background thus provides the firm with the ability to react to more new opportunities for innovation based on external knowledge (Cohen and Levinthal 1990, Henderson and Cockburn 1994) Given that this rationale relies on the number rather than the novelty of opportunities, we also expect that technological diversity enhances incremental innovation In summary

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[1] Several of the relationships under study are also on the 2002–2004 Marketing Science Institute research priority list (e g , valuation of innovation, developing radical innovation, alliances and partnerships), which indicates the high relevance of the topic

> H_1 Greater technological diversity of a firm's portfolio of interfirm R&D agreements enhances the firm's (a) radical innovation and (b) incremental innovation

Level of repeated partnering A general benefit of repeated agreements with the same partners is that the focal firm comes to know its partners better, which may enhance its ability to assess its partners' capabilities and consequently identify new opportunities for cooperation As such, frequent cooperation with the same partner can generate a unique source of information about potential new opportunities (Gulati 1999) We expect that the benefit of repeated partnering leading to better identification of new opportunities enhances both incremental and radical innovation

Repeated partnering also generates an advantage that is specifically related to radical innovations Radical innovations encompass major improvements over existing products and therefore benefit from *complex* (i e , tacit and interdependent) knowledge transfer (Iansiti and West 1997, Zucker, Darby, and Armstrong 2002) The average scientific discovery is not codified, which illustrates the significance of the tacit component of knowledge in TI markets (Zucker, Darby, and Armstrong 2002) Frequent and repeated interaction facilitates the transfer of tacit knowledge (Hansen 1999) and generates a deeper understanding of new technologies and innovations (Dewar and Dutton 1986, Fichman and Kemerer 1997) Repeated interaction allows for the emergence of relationship-specific heuristics (Uzzi 1997) and induces shared mental models (Madhaven and Grover 1998) [2] These heuristics and shared mental models in turn facilitate the process of assimilating complex knowledge (Polanyi 1966) The effective assimilation of complex knowledge in turn facilitates radical innovation In short, we expect the following

> H_2 Higher levels of repeated partnering of a firm's portfolio of interfirm R&D agreements enhance the firm's (a) radical innovation and (b) incremental innovation

Note that in line with this reasoning, support for H_{2a} and H_{2b} would indicate that repeated partnering effectively drives the identification of new opportunities, but support for only H_{2a} would indicate that repeated partnering primarily facilitates the transfer of tacit knowledge

Agreement Portfolios and Profitability

We expect not only that the portfolio characteristics, through their impact on knowledge access and transfer, affect radical and incremental innovation but also that they have additional direct effects on profitability We distinguish between demand- and supply-side effects of agreement portfolio characteristics on profitability

First, agreement portfolios affect the demand side of profitability through the stock of radical and incremental innovations they generate Innovations are often credited for generating sales growth and thereby aiding profitability In addition, it can be expected that radical innovations are more profitable than incremental innovations, because they represent significant advances in customer benefits, among other reasons Second, agreement portfolios affect the supply side of profitability As we argue subsequently, the technological diversity and level of repeated partnering of a firm's R&D agreement portfolio influence the costs of partnering as well as the firm's ability to extract rent from the agreements

Demand Side: Stocks of Radical and Incremental Innovations and Profitability

Over time, firms build stocks of radical and incremental innovations Higher levels of innovation enhance a firm's profitability (Geroski, Machin, and Van Reenen 1993) However, it is not clear whether this is true to the same extent for a firm's stock of radical innovations and its stock of incremental innovations The general belief in marketing is that radical innovations disproportionately contribute to profitability (Wind and Mahajan 1997) The underlying rationale follows directly from the definition of radical innovations First, radical innovations offer significant improvements over existing alternatives in terms of need satisfaction and thus may trigger higher demand Second, radical innovations are based on new and complex technologies and are thus more difficult for competitors to imitate (Dutta, Narasimhan, and Rajiv 1999) We hypothesize the following

> H_3 A firm's stock of radical innovations and its stock of incremental innovations enhance profitability
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> H_4 The effect of a firm's stock of radical innovations on profitability is greater than the effect of a firm's stock of incremental innovations on profitability

Supply Side: Agreement Portfolio Composition and Profitability

We now turn to the supply-side effects of the portfolio characteristics on profitability in addition to their indirect demand-side effect through (stocks of) radical and incremental innovations These effects are grounded in cost and rent-extraction rationales

Technological diversity Higher levels of technological diversity require higher costs The cost of building a minimum level of knowledge (unit-one cost) is typically very high (John, Weiss, and Dutta 1999) Therefore, firms that develop a broad technological background typically face higher costs (Gatignon and Xuereb 1997) For example, in the pharmaceutical industry, to a large extent, strategic decision making is determined by the high costs required to acquire new technologies, as is illustrated by Guidant's difficulties in deciding whether to engage in radiation therapy for the treatment and prevention of restenosis (Roberts 2001) Not only was there a great deal of uncertainty about the effectiveness of radiation therapy, but an initial investment cost was estimated at anywhere between $60 million and $100 million Firms' building a portfolio of R&D agreements that covers a large diversity of technologies may considerably enhance the total investment costs In contrast, making further advances in technology classes in which the firm is already active requires fewer additional investments than advances in technology classes that are new to the firm Thus, concentration of the agreement portfolio around fewer technologies may be more cost efficient than diversification of the agreement portfolio over a wide set of technologies

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[2] The argument relies on the frequency of partnering between two actors (see, e g , Hansen 1999) and does not imply an underlying time dimension

> H_5 When the level of innovation is controlled for, greater technological diversity of a firm's portfolio of interfirm R&D agreements lowers the firm's profitability

Level of repeated partnering The literature offers different rationales for the direct impact of repeated partnering on profitability in addition to its indirect impact through innovation Repeated partnering may contribute to cost efficiency Cooperation with the same partner is cheaper than cooperation with a new partner In the context of industrial purchasing relationships, Stump and Heide (1996) find that partnering with the same partner is cost-efficient because previous qualification efforts reduce the need for new qualification and monitoring practices In other words, firms are able to examine their prior partners' capabilities (Håkansson 1993) In this sense, a major risk factor to agreements (i e , the extent to which the partner is capable of doing what it claims to be able to do) is minimized, which may represent a substantial saving of time and money lost in contracting with the wrong partner However, this positive relationship is unlikely to be linear Prior research has shown that firms' cooperating too frequently with the same partners may result in more attention for relationship maintenance and loyalty than for the economic outcomes of cooperation In other words, firms' cooperating too frequently with the same partners can stifle effective economic action if social aspects supersede economic imperatives (Uzzi 1997) As a result, levels of repeated partnering that are too high can cause a decline in profitability[3] We posit the following

> H_6 When the level of innovation is controlled for, the level of repeated partnering of a firm's portfolio of interfirm R&D agreements has an inverted U-shaped effect on the firm's profitability

Other Variables

In addition to the relationships posited previously, we control for other variables that may affect radical innovation, incremental innovation, and profitability but that are outside our theoretical focus

Portfolio size Portfolio size refers to the number of R&D agreements that make up a portfolio and, in general, is considered to facilitate obtaining more exposure to knowledge bases (see, e g , Dewar and Dutton 1986) Previous studies have documented the positive impact of portfolio size on innovation (Powell, Koput, and Smith-Doerr 1996, Shan, Walker, and Kogut 1994) Large portfolios lead to scale effects in development (Ahuja 2000) and facilitate firms gaining more exposure to knowledge from external sources (Dewar and Dutton 1986) However, portfolio size's effect on radical innovation is not clear As for profitability, firms' greater experience with interfirm agreements has been associated with positive firm outcomes (Powell, Koput, and Smith-Doerr 1996) The large number of agreements provides the firm with a broad repertoire of experiences that result from previous trials and tribulations (Anand and Khanna 2000) The resulting experience effects not only enhance cost efficiency of cooperation but also make firms better able to extract rent from their agreements (Gulati, Nohria, and Zaheer 2000), which both contribute to profitability

Resident knowledge A firm's portfolio of R&D agreements provides insight into its access to external knowledge bases and subsequently into its ability to generate innovations However, in the process of turning knowledge into actual innovative products, other variables come into play Firms should be able not only to detect and absorb relevant new technologies and new knowledge but also to apply this knowledge effectively (as formalized in the absorptive capacity argument, Cohen and Levinthal 1990) We expect that a firm's resident knowledge has a positive effect on both innovation and profitability, because it is likely to aid in all processes of detection, absorption, and application

Experience In the radical and incremental innovation equations, we also control for a firm's prior experience in developing radical and incremental products, respectively Prior experience reflects the processes that the firm has in place to innovate successfully Firms with internal organizational processes that have facilitated radical and incremental innovation in the past are more likely to generate new radical and incremental innovations in the future

R&D expenditures Another variable that may influence innovation and profitability is the level of a firm's R&D expenditures We expect that firms that devote more resources to R&D are more successful with respect to innovation and profitability

Sales expenditures In the profitability equation, we further control for sales expenses In the pharmaceutical industry, the setting of our empirical study, direct selling through medical representatives is by far the most influential marketing instrument (Parsons and Vanden Abeele 1981), there were more than 80,000 sales representatives in the field in 2001 (Shalo 2002) We expect that sales expenditures have a positive effect on profitability

Trend and industry shocks Previous studies suggest that the growth of the biotechnology industry has led to more intense competition (Zucker, Darby, and Brewer 1994) We expect that this increasing competitive intensity will be reflected in a negative time trend in the innovation and profitability equations Apart from a linear industry trend over the entire observation period, there may have been other events that occurred in specific years that affected the outcome variables We include year dummies to control for such exogenous shocks, and we retain the ones that have a significant impact on the outcome variables in the final model

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[3] Note that this argument provides a novel interpretation of what Grayson and Ambler (1999) refer to as the "dark side" of strong ties We suggest that the downside of strong ties lies in their restrictive effect on economically optimal behavior

Firm size Much prior research in economics has addressed the relationship between firm size and innovation, building on the seminal work of Schumpeter (1942) Academic research investigating this relationship has found positive, negative, and insignificant size effects (Chandy and Tellis 2000, Cohen and Levin 1989) As for profitability, we expect larger firms to make more profits, in an absolute sense, merely because of a scale effect

Methodology

Empirical Setting

The empirical setting of our study is the pharmaceutical industry In particular, we examine the effect of a pharmaceutical firm's portfolio of agreements with biotechnology firms on innovation and profitability The discoveries of recombinant DNA (by Cohen and Boyer in 1973) and cell fusion (by Kohler and Milstein in 1975) gave rise to the modern biotechnology industry Pharmaceutical firms reacted to the biotechnology revolution by building portfolios of upstream R&D agreements with biotechnology firms to access new scientific and technological developments (see, e g , Pisano 1990)

There are several reasons we chose this context First, the pharmaceutical industry is a TI industry in which scientific knowledge plays a focal role Second, interfirm cooperation in the pharmaceutical industry boomed with the rise of biotechnology, especially since the second half of the 1980s From 1985 on, interfirm agreements with established pharmaceutical firms have overtaken venture capital as the main form of financing the biotechnology industry (Zucker, Darby, and Brewer 1994) At the end of the 1990s, R&D agreements between pharmaceutical firms and innovative biotechnology firms provided eight times more capital to U S biotechnology firms than did initial public offerings (Enríquez 1998) As we described previously, pharmaceutical firms developed portfolios of R&D agreements with substantial variation in their composition Third, secondary data are available on all interfirm agreements between pharmaceutical firms and biotechnology firms in the United States since 1985 (i e , from the inception of alliance activity in the biotechnology industry)

Data Collection

We collected data to test our theoretical predictions from four different sources First, we collected data on pharmaceutical firms' upstream R&D agreements with biotechnology firms from the Recombinant Capital database This database covers all such upstream R&D agreements from 1985 until the present It provides information on the identity of the parties to the agreement, the nature of the agreement, and the technologies that the agreement covers (categorized into 42 technological classes) Recombinant Capital is a consulting firm that specializes in biotechnology alliances, it is based in the San Francisco Bay Area and was founded by a former manager of business development at Chiron. Recombinant Capital's clients include more than 150 biotechnology and pharmaceutical firms, as well as several universities and investment banking and venture firms active in the biotechnology area Recombinant Capital uses several sources to ensure the accuracy of its database trade literature, press releases, and its close links and interactions with experts involved in biotechnology in the pharmaceutical industry

Second, we collected data on new drugs from the drug approval list of the Food and Drug Administration (FDA) This list provides all drugs approved by the FDA and is updated weekly Moreover, in this list, the FDA provides additional useful information about each drug, namely, its therapeutic potential and chemical type We use this additional information to distinguish radical drugs from incremental drugs

Third, we collected data on profitability, firm size, sales expenses, and R&D expenses from the Compustat database Fourth, we collected data on biotechnology patents and patent citations from the U S Patent and Trademark Office database

The database we compiled from the four sources contains yearly data on the agreement portfolios of 58 publicly traded pharmaceutical firms from 1985 to 1998 In total, our database covers 991 R&D agreements For each year (1985–1998) and pharmaceutical firm, the database also contains information on profits, size, sales expenses, R&D expenses, and citation-weighted patents We used data on new drugs from 1991 to 1999 Before 1991, the FDA did not provide the detailed and complete drug information required for our study (for sample descriptives, see Table 1)

Measurement

Dependent variables We measured *radical innovation* of firm i in year t ($RADINNOV_{it}$) as the total number of new radical drugs of firm i that received FDA approval in year t Given that radical drugs should both provide substantially higher customer benefits than previous drugs in the industry and incorporate a substantially different core technology (or active ingredient) (Chandy and Tellis 1998, 2000), we base our radicalness distinction on two drug properties provided by the FDA a drug's therapeutic potential and its chemical type First, the FDA (2002) categorizes all new drugs according to their treatment potential and distinguishes between standard ("therapeutic qualities similar to those of an already marketed drug") and high-potential ("an advance over available therapy") drugs Second, the FDA assigns a chemical type to each drug Only drugs of Chemical Type 1 represent a new technology (i e , different from the established technologies), they involve an "active ingredient that has never been marketed" (see FDA 2002) We refer to all drugs that are labeled both high-therapeutic-potential drugs and Chemical Type 1 drugs as radical drugs In total, 13 7% of the newly approved drugs in our database are labeled radical drugs, which compares favorably with cross-industry estimates (i e , approximately 10%, see Wind and Mahajan 1997) and with a recent study in the pharmaceutical industry by the National Institute for Health Care Management (15%, Wechsler 2002)

TABLE 1
Sample Characteristics

	Minimum	Maximum	Average	Standard Deviation
Repeated partnering	0	88	22	18
Technological diversity	24	93	70	16
Portfolio size	0	84	6 33	11 57
Number of radical drugs (per year)	0	2	09	33
Number of incremental drugs (per year)	0	8	54	1 16
Profitability (in 10^6 \$)	–756 15	6821 7	494 90	910 77
Firm size (in 10^3)	015	151 9	20 89	26 26
R&D expense (in 10^6 \$)	0	4435	399 05	631 37
Selling, general, and administrative expense (in 10^6 \$)	1 63	15877	1700 02	2547 20

We measured *incremental innovation* of firm i in year t ($INCINNOV_{it}$) as the total number of new incremental drugs of firm i that received FDA approval in year t All drugs that do not satisfy both radicalness conditions (high therapeutic potential and Chemical Type 1) are labeled incremental drugs

We measured *profitability* of firm i in year t ($PROFIT_{it}$) as the net income of firm i in year t Profitability is the net income (loss) variable provided by Compustat

Independent variables We measured the *technological diversity* of a firm's agreement portfolio ($TECHDIV_{it}^{cum}$)[4] as follows (see Powell, Koput, and Smith-Doerr 1996) For firm i up to year t, we denote the number of times that the firm's agreements cover technology j as $n_{it,j}$ $(j = 1 \quad 42)$[5] Then, $p_{it,j} = n_{it,j}/\Sigma_j n_{it,j}$ represents the proportion of occurrence of technology j relative to the cumulative occurrence of all technologies in firm i's portfolio We square each $p_{it,j}$ and then take the sum over all technologies j, we subtract the sum from 1, which results in the index of technological diversity

$$(1) \qquad TECHDIV_{it}^{cum} = 1 - \sum_{j=1}^{J} p_{it,j}^2$$

The technological diversity index equals zero when a firm allies on only a single technology, and it is close to one when a firm spreads its alliance activity over many technologies An example further clarifies how this measure behaves Suppose that two firms (A and B) both have a portfolio of four agreements The agreements of Firm A involve three different technologies (Agreements 1 and 2 involve technology x, Agreement 3 involves technology y, Agreement 4 involves technology z), and the agreements of Firm B involve two different technologies (Agreements 1 and 2 involve technology x, Agreements 3 and 4 involve technology y) It is easily computed that Firm A has a technological diversity of 625, and Firm B has a technological diversity of 5 In a sense, this measure is similar to Hirschman–Herfindahl indexes in the economics literature (which are typically used to measure market concentration as the sum of squared market shares)

Repeated partnering (REP_{it}^{cum}) is a ratio that measures the extent to which firms cooperate with the same partners in a given period of time[6] For firm i up to year t, we denote the number of different partners in its agreement portfolio as P_{it}^{cum} and the number of agreements as A_{it}^{cum} We then define repeated partnering of firm i up to year t as

$$(2) \qquad REP_{it}^{cum} = 1 - \left(P_{it}^{cum}/A_{it}^{cum}\right)$$

The index of repeated partnering equals zero when a firm never cooperates twice with the same partner, and it is close to one when the firm cooperates frequently with the same partner In the stylized example of Equation 1, if Firm A cooperates with three different partners and Firm B with two different partners, Firm A's level of repeated partnering is 75, and Firm B's level of repeated partnering is 5

Finally, we measured a firm's *stock of incremental innovations* ($INCSTOCK_{it}^{cum}$) as the cumulative number of incremental innovations ($INCINNOV_{it}$) from 1991 until year t Similarly, we measured a firm's *stock of radical innovations* ($RADSTOCK_{it}^{cum}$) as the cumulative number of radical innovations ($RADINNOV_{it}$) from 1991 until year t

Control variables We measured portfolio size of firm i in year t ($PORFSIZE_{it}^{cum}$) as the total number of R&D agreements, A_{it}^{cum}, of firm i from 1985 up to year t We measured the amount of resident knowledge as the citation-weighted biotechnology patent counts, corrected for truncation bias (Dutta and Weiss 1997, Griliches 1990, Trajtenberg 1990) The U S Patent and Trademark Office provides detailed information on all biotechnology-related patents (at year t), including the number of times the patents have been cited in a given year $(t + 1, t + 2, \quad , T)$ We included all patents from 1975 (the year in which the citations were registered first) and on, and we constructed a cumulative variable $PATENT_{it}^{cum}$ We corrected the measure for truncation as follows (see also Hall, Jaffe, and Trajtenberg 2001) For early patents at Time t_0, we calculated the average citation pattern (the number of times the patents are cited) over the period $[t_0 + 1, T]$ More specifically, for each year $t \in [t_0 + 1, T]$, we derived the proportion of all citations for the patents that occurred in the period $[t_0 + 1, t]$ For more recent patents (e g , in year 1996), we had citation data for only a limited number of years For these recent patents, we calculated the expected number of citations in the future by extrapolation, on the basis of the total number of citations that already occurred in the first years and assuming that the citation pattern is similar to that for early patents

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[4] The cumulative (up to year t) character of a variable is indicated with the superscript "cum"

[5] One agreement can cover multiple technologies, one biotechnology firm can have multiple technologies in-house

[6] This index measures the extent to which firms cooperate with the same partners (i e , it does not necessarily refer to relational history)

As proxies for a firm's experience with radical and incremental innovation, we include $\text{RADSTOCK}^{cum}_{it-1}$ and $\text{INCSTOCK}^{cum}_{it-1}$ in the respective innovation equations These lagged variables reflect the processes that are set by the firm to generate innovations

Furthermore, the Compustat database contains measures on sales expenses (SALESEXP_{it}), R&D expenses ($\text{R\&D}_{it}$), and firm size (FIRMSIZE_{it}) Note that sales expenses are represented in Compustat as sales, general, and administrative expenses We measure firm size as the number of employees

Findings

Model Estimation

Radical and incremental innovation models We measured radical innovation of firm i at time t as the total number of radical drugs of firm i approved by the FDA at time t (RADINNOV_{it}) We estimated a negative binomial maximum-likelihood regression model, which is an appropriate specification in view of the count character of the dependent variable and the relatively large number of zeros (which are a natural and relevant outcome of the count process) In our case, a (simpler) Poisson specification was not appropriate because of overdispersion [7] The underlying assumption of the Poisson model of equality of conditional mean and variance functions is violated, which leads to inefficient Poisson estimates

As explanatory variables, we included $\text{TECHDIV}^{cum}_{it-1}$ and REP^{cum}_{it-1} We measured all portfolio descriptors (technological diversity, repeated partnering, and size) at time t over the cumulative portfolio up to year t (Dutta and Weiss 1997) There is likely a lag between firms' partnering activities and the resulting innovative output Although the cumulative variables partly account for this, we lagged all our portfolio characteristics with one period We also lagged the control variables with one period We control for $\text{PORFSIZE}^{cum}_{it-1}$, $\text{RADSTOCK}^{cum}_{it-1}$, $\text{PATENT}^{cum}_{it-1}$, TREND, year dummy variables, $\text{R\&D}_{it-1}$, and FIRMSIZE_{it-1}

We measured incremental innovation of firm i at time t as the total number of incremental drugs of firm i approved by the FDA at time t (INCINNOV_{it}) As in the radical innovation model, we estimated a negative binomial model for the incremental innovation equation, with $\text{TECHDIV}^{cum}_{it-1}$ and REP^{cum}_{it-1} as explanatory variables We controlled for $\text{PORFSIZE}^{cum}_{it-1}$, $\text{INCSTOCK}^{cum}_{it-1}$, $\text{PATENT}^{cum}_{it-1}$, TREND, year dummy variables, $\text{R\&D}_{it-1}$, and FIRMSIZE_{it-1} Table 2 presents a correlation matrix of our portfolio descriptors

Profitability model We measured profitability of firm i at time t as the net income of firm i at time t (PROFIT_{it}) Because PROFIT_{it} is a continuous variable, we used an ordinary least squares regression specification in which we regressed PROFIT_{it} on the variables $\text{RADSTOCK}_{it}^{cum}$, $\text{INCSTOCK}_{it}^{cum}$, $\text{TECHDIV}^{cum}_{it-1}$, REP^{cum}_{it-1}, $\text{PORFSIZE}^{cum}_{it-1}$, $\text{PATENT}^{cum}_{it-1}$, TREND, year dummy variables, $\text{R\&D}_{it-1}$, SALESEXP_{it-1}, and FIRMSIZE_{it-1} In all equations, we mean-centered the independent variables In line with intuition, we again lagged all independent variables, except for the stock of incremental and radical innovations, because new drugs already affect profitability in the introduction period

Results

Table 3 presents the estimation results for the radical and incremental innovation equations Table 4 presents the estimation results for the profitability equation

Radical and incremental innovation Technological diversity positively influences both radical innovation (β = 1 535, $p <$ 001) and incremental innovation (β = 426, $p <$ 05), in support of H_1 A more diverse portfolio strengthens a firm's basis for learning and enhances its absorptive capacity (Cohen and Levinthal 1990), thereby enabling it not to miss the most recent technological developments As such, a technologically diverse portfolio enhances the firm's number of NPD opportunities and lowers the risk of lock-in with inferior technologies (Levinthal and March 1993)

We find that whereas repeated partnering enhances radical innovation (β = 680, p = 001), in support of H_{2a}, its effect on incremental innovation is not significant (β = – 013, p = 927), which rejects H_{2b} This finding seems to indicate that repeated partnering serves as more of a facilitator for complex knowledge transfer than an aid for opening up new opportunities

We also included several control variables in the innovation equations First, portfolio size has a significant, positive effect on incremental innovation (β = 252, $p <$ 05) but does not affect radical innovation (β = 173, p = 350) Apparently, despite the central place of the mere size of the port-

TABLE 2
Correlation Matrix Portfolio Descriptors

	TECHDIV	REP	PORFSIZE
TECHDIV	1 000		
REP	– 205	1 000	
PORFSIZE	542	– 213	1 000

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[7] In a negative binomial regression, the count variable is believed to be generated by a Poisson-like process, except that the variation is greater than that of a true Poisson (referred to as "overdispersion") Although in a case of overdispersion the Poisson model still provides consistent estimates, the standard errors are underestimated The negative binomial model we use does not suffer from this problem

TABLE 3
Innovation Equations

	Radical Innovation Equation (RADINNOV)				Incremental Innovation Equation (INCINNOV)			
Variable	Parameter Estimate	Standard Error	z-Value	*p*-Value (Two-Tailed)	Parameter Estimate	Standard Error	z-Value	*p*-Value (Two-Tailed)
TECHDIV	1 535	430	3 57	000	426	172	2 48	013
REP	680	196	3 47	001	– 013	144	– 09	927
PORFSIZE	173	185	93	350	252	111	2 27	023
RADSTOCK(–1)	231	173	1 34	181	—	—	—	—
INCSTOCK(–1)	—	—	—	—	380	130	2 91	004
PATENT	019	137	14	891	– 093	084	–1 10	269
TREND	–1 736	531	–3 27	001	–1 024	233	–4 39	000
DUMMY96	1 189	341	3 49	000	646	222	2 91	004
R&D	491	264	1 86	063	313	151	2 07	038
FIRMSIZE	– 268	268	–1 00	317	080	129	62	536
Intercept	–2 688	301	–8 94	000	– 664	132	–5 02	000
Fit	Pseudo R^2 = 25				Pseudo R^2 = 17			
	Likelihood ratio χ^2 (9) 75 03, $p <$ 001				Likelihood ratio χ^2 (9) 147 88, $p <$ 001			
N	426				426			

TABLE 4
Profitability Equation

	Profitability Equation (PROFIT)			
Variable	Parameter Estimate	Standard Error	t-Value	p-Value (Two-Tailed)
RADSTOCK	123 379	35 302	3 49	001
INCSTOCK	2 145	44 953	05	962
TECHDIV	–73 400	34 901	–2 10	036
REP	266 073	81 801	7 06	000
REP^2	–141 050	29 892	–4 72	000
PORFSIZE	300 231	42 516	7 06	000
PATENT	35 084	21 621	1 62	105
TREND	–171 252	41 675	–4 11	000
R&D	44 759	88 964	50	615
SALESEXP	1085 487	118 178	9 19	000
FIRMSIZE	–453 765	55 363	–8 20	000
Intercept	617 782	28 837	21 42	000
Fit	Adjusted R^2 = 80 F(11, 443) 156 05, $p < 001$			
N	455			

folio in industry discourse, it provides access to more opportunities, but it does not provide the depth or diversity of knowledge that stimulates radical innovation Second, we included the lagged stocks of innovations as indicators of the firm's prior experience with radical and incremental innovation We find that both have the expected positive sign, but only the prior stock of incremental innovations is significant ($\beta = 380$, $p < 01$) The stock of prior radical innovations is not significant ($\beta = 231$, $p = 181$) A large stock of prior incremental innovations seems to aid in the development of new incremental innovations, whereas a track record of radical innovation is no guarantee for future success in radical innovation Third, we controlled for resident knowledge using a citation-weighted patent variable Surprisingly, this variable is not significant in both equations (radical $\beta = 019, p = 891$, incremental $\beta = -093, p = 269$) Further exploration reveals a quadratic effect of patents on incremental innovation More specifically, we find an inverted U-shaped effect (main term $\beta = 439$, $p < 05$, quadratic term $\beta = -184$, $p < 01$) The role of patents requires further research Fourth, we find a negative time trend in both the radical innovation ($\beta = -1\ 736$, $p = 001$) and the incremental innovation ($\beta = -1\ 024$, $p < 001$) equations Furthermore, we find one year dummy variable (1996) to be significant, we retained this variable in both the radical innovation ($\beta = 1\ 189$, $p < 001$) and the incremental innovation ($\beta = 646$, $p < 01$) equations Although the following is only a *post hoc* interpretation, the 1996 effect may result from the U S administration urging the FDA in early 1996 to speed up its approval procedures in major therapeutic classes (as reported on the *FDA News* Web site, Cruzan 1996) Finally, we find that the effect of R&D expenses is positive and significant in both innovation equations (radical $\beta = 491, p < 10$, incremental $\beta = 313, p < 05$) However, the effect of firm size is not significant in any of the two innovation equations (radical $\beta = -268$, $p = 317$, incremental $\beta = 080, p = 536$)

Profitability As for the profitability equation, we posited in H_3 that both a firm's stock of radical innovations and its stock of incremental innovations enhance profitability We find only partial support for this, with a positive effect for the stock of radical innovations ($\beta = 123\ 379$, $p = 001$) and no significant effect for the stock of incremental innovations ($\beta = 2\ 145$, $p = 962$) [8] In H_4, we hypothesized that the stock of radical innovations would have a greater positive effect on profitability than the stock of incremental innovations A Wald test rejected the null hypothesis that the parameters are equal in size ($F = 3\ 168$, $p < 10$), so we can conclude that the effect of radical innovation indeed is greater than that of incremental innovation We also conducted additional likelihood ratio tests that consistently point to the same conclusion [9]

In accordance with H_5, we find a negative, direct effect of technological diversity on profitability ($\beta = -73\ 400$, $p < 05$) This negative effect indicates that firms have difficulties recouping the high initial investment costs required for a technologically diverse portfolio

We posited in H_6 that repeated partnering has an additional inverted U-shaped effect on profitability We find strongly significant main and quadratic effects in support of

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[8] We also estimated the model with a ratio variable (per firm and year t) that measures the proportion of a firm's drugs that are radical This ratio approach did not change any of the other results, and the ratio itself had a positive, though only marginally significant ($p = 141$), effect on profitability

[9] We conducted likelihood ratio tests to study the extra variance explained by the stock of radical innovations and the stock of incremental innovations, respectively Deletion of radical innovation from a profit model that includes incremental innovation significantly deteriorates the log-likelihood ($p < 01$), whereas omission of incremental innovation from a profit model that includes radical innovation does not significantly affect the log-likelihood

H_6 (main term $\beta = 266\ 073$, $p < .001$, quadratic term $\beta = -141\ 050$, $p < .001$). Low levels of repeated partnering require substantial partner qualification costs, whereas high levels of repeated partnering restrict economically optimal behavior. When innovative output is controlled for, the optimum lies at medium levels of repeated partnering.

Finally, we included several control variables. First, we find a positive effect of portfolio size on profitability ($\beta = 300\ 231$, $p < .001$), in support of the argument that firms with larger portfolios enjoy experience effects that result in cost efficiency and better rent extraction. Second, the amount of resident knowledge has a (weak) positive effect on profitability ($\beta = 35\ 084$, $p = .105$). Third, as in the innovation equations, we find a negative time trend ($\beta = -171\ 252$, $p < .001$). However, none of the year dummies were significant, which further strengthens our interpretation that the 1996 effect in the innovation equations is related to a temporary extra effort by the FDA. For the other control variables—R&D expenditures, sales expenditures, and firm size—we respectively find no effect ($\beta = 44\ 759$, $p = .615$), a positive effect ($\beta = 1085\ 487$, $p < .001$), and a negative effect ($\beta = -453\ 765$, $p < .001$).

Robustness of Results

Time lags. In our model estimation, we lagged all explanatory variables, except for innovation stocks in the profit equation, with one year. We examined the sensitivity of our results by applying different lag structures (e.g., two years, three years), the focal results remain unchanged. Note that working with lagged cumulative independent variables further supports our notion of causality, in that a dependent variable at time T is explained by the entire portfolio from t = 0 up to t = T – 1.

Knowledge depreciation and appreciation. Another important issue is whether the value of knowledge changes over time. There are three possibilities: no change, depreciation, or appreciation. Although our analyses assumed that knowledge has a constant value, we also checked the robustness for changes in its value over time. On the one hand, a certain depreciation rate could be specified, which would enable knowledge to become worth less over time, which may be especially relevant in TI markets (Glazer and Weiss 1993). Prior literature typically uses a 20% depreciation rate (e.g., Henderson and Cockburn 1994). On the other hand, it could be argued that complex knowledge is not readily available for use immediately after assimilation and that knowledge becomes worth more as it becomes more embedded in the organization (e.g., Madhaven and Grover 1998). Such reasoning would suggest an appreciation rate rather than a depreciation rate. We estimated our model with depreciation/appreciation rates ranging from .8 to 1.2, and we found our results to be robust for knowledge depreciation and appreciation. Thus, our assumption that knowledge has a constant value does not affect our results.

Alternative model specifications. Finally, we tested alternative model specifications. We specified an ordered probit structure rather than the negative binomial for the innovation models. We also estimated nested models and models containing interaction effects to verify the robustness of our findings. None of the exploratory efforts provided additional insights, and the posited theoretical effects were unaffected and remained similar to the ones we reported.

Implications

Our study has several implications for both theory development and practice. We discuss two major theoretical implications and two major managerial implications, respectively.

Theoretical Implications

Our detailed portfolio perspective contributes to both the marketing and the network literature. First, the marketing literature on innovation and NPD may benefit from our study in different ways. By taking a portfolio perspective, our study empirically substantiates a belief shared by many marketing scholars (Achrol 1997; Kotler, Jain, and Maesincee 2002), namely, that such a broadened perspective would significantly enhance the understanding of marketing phenomena in dynamic markets. Despite the shared understanding in conceptual work, empirical studies have been scarce (Stern 1996). Our study points to the importance of considering R&D agreements in TI markets not in isolation but from a portfolio perspective, which provides insight into a firm's ability to access diverse and complex knowledge bases. Thus, this study enriches prior work in marketing on the drivers of innovation. Although several studies have pointed to the importance of R&D capability for success in TI markets (Dutta, Narasimhan, and Rajiv 1999) and for product development broadly (e.g., Moorman and Slotegraaf 1999), the focus has been on internal processes and knowledge domains. Our findings suggest that access to external knowledge domains can also have an important bearing on a firm's ability to develop new products. Prior work has also acknowledged interfirm knowledge sharing as an important driver of innovation (Rindfleisch and Moorman 2001; Sivadas and Dwyer 2000). Our portfolio perspective extends this idea and shows that a holistic view that transcends the individual agreement is required to assess the success of a firm's overall efforts to share knowledge with industry partners.

Second, our study also contributes to the network literature. Recent network studies suggest that repeated and intense cooperation enhances the risk of lock-in with inferior technologies and myopia caused by higher knowledge redundancy (e.g., Rowley, Behrens, and Krackhardt 2000; Uzzi 1997). Our study shows that this rationale may be misleading in TI markets for two reasons. First, contrary to the seminal work in sociology on which this argument is based (Granovetter 1973), the knowledge that is transferred in TI markets does not consist of simple bits of information but has an important tacit component. Frequent cooperation with the same partners facilitates the transfer of tacit knowledge. Second, rather than consider repeated collaboration as a proxy for knowledge redundancy, we show how knowledge diversity can be accounted for more directly. The diversity of technologies that underlie the different agreements is a more direct approximation of the extent to which a firm is able to access nonredundant knowledge. Thus, we were not surprised to find that for given levels of technological diversity, repeated partnering actually enhances radical innovation On a related note, our findings suggest that in TI markets, both the benefits of nonredundant knowledge and its downside should be considered Access to diverse or nonredundant knowledge requires high investment costs, and firms often have a difficult time recouping the initial investments Our findings can help explain why other studies did not find a hypothesized negative relationship between knowledge redundancy and firm performance (see, e g , Rowley, Behrens, and Krackhardt 2000)

Managerial Implications

Our study reveals how a firm's portfolio of agreements can be managed in accordance with different firm objectives Our findings also further underscore the importance of radical innovation for profitability

First, on the basis of our findings, we can provide managers with guidelines as to how to build an effective portfolio according to their specific objectives We offer a set of useful portfolio descriptors that can be measured and managed when decision makers are prepared to look beyond the individual agreement Whereas the industry literature overaddresses portfolio size, we provide a richer perspective and point to the importance of portfolio diversity and repeated partnering Moreover, we acknowledge that firms may have different or multiple objectives (radical innovation, incremental innovation, and profitability), which may bring forth different challenges As such, we recommend that firms that have the end objective of radical innovation invest in a technologically diverse portfolio to gain access to a diverse knowledge base in which it repeatedly contracts with the same partners to facilitate complex knowledge transfer Companies that focus on the bottom line (profitability) should balance the demand-side advantages of radical innovations with the supply-side drawbacks of technological diversity and repeated partnering It is important to note that firms can easily monitor and manage the portfolio descriptors we suggest

Second, our study empirically underscores the importance of radical innovation and emphasizes the need to develop an appropriate R&D agreement portfolio for radical innovation Firms should improve the balance between incremental and breakthrough innovation (Wind and Mahajan 1997), but they also may need to turn radical innovation into the core objective of their innovation strategies if their end goal is maximizing profits Notably, we find that whereas prior experience with incremental innovations entails new incremental innovations, prior experience with radical innovations does not guarantee new radical innovations in the future

Limitations and Further Research

As a first limitation, we note that our sample includes mainly large firms that are publicly traded Although the sample is a good representation of the industry being studied, it may limit the generalizability of our results We also focus on only one industry An interesting area for further research would be to compare industries and test the generalizability of the effects of different portfolio descriptors on performance

Although we take into account the identity and knowledge domains of a focal firm's partner firms, there may be several other partner characteristics (e g , the extent to which firms perceive the pharmaceutical firm's other partners as their competitors) that affect the actual transfer of knowledge Ideally, further research would collect firm-specific data on each of a firm's partner firms However, we foresee that this may be a challenging undertaking Many partner firms may not be publicly traded, thereby restricting the available information

We studied only a firm's portfolio of upstream R&D agreements Further research might examine a firm's downstream marketing agreements as well and their impact on profitability We also assumed that all agreements are of similar strength, which may have been a reasonable assumption given our focus on one specific type of cooperation (R&D agreements) but that may be difficult to defend in other empirical settings in which joint ventures and mergers play a more important role

As for profitability, we do not distinguish between short- and long-term effects on profits Although we consider this distinction beyond the scope of the current study, future studies might offer the theoretical basis and the appropriate data to disentangle the effects In addition, our stocks approach to understanding the impact of a firm's innovativeness on profitability can be challenged This approach somehow conflicts with NPD literature that examines flows of innovations rather than stocks Future studies that focus on the role of portfolios of interfirm agreements on companies' NPD processes (e g , the ongoing stream of development projects) would be fruitful

In addition, we do not provide any information on processes that occur inside the firm Rather, we control for general proxies such as R&D expenditures, prior innovation experience, and patents Our theory implies that new drugs result, at least in part, from collaboration efforts Thus, we do not assess the extent to which new drugs result from purely internal development processes rather than external collaboration Although internal development processes are affected by resident knowledge, which is in turn gained (at least in part) through collaboration, we do not allow for such an effect explicitly Further research should focus on the complex relationships between internal development processes and external collaboration

Finally, by definition, our dependent innovation variables only reflect successful NPD efforts It may be useful for further research to study the role of agreement portfolios in situations of NPD failure as well In addition, we believe that our finding that incremental innovations have no significant effect on profitability is somewhat surprising The role of incremental innovations in conjunction with radical innovations is another interesting issue for further research It could be argued that firms face a trade-off between radical and incremental innovation that resembles the trade-off between exploration and exploitation discussed in the organizational behavior literature (e g , March 1991) Garcia, Calantone, and Levine (2003) show that contingent on the level of competition and the profitability of a firm's NPD activities, the exploitation of existing knowledge bases through refinement and recombination might be more advisable than exploration of new knowledge bases in the short run Translated to our setting, the generation of incremental innovations that represent refinements of prior successful radical innovations may sometimes be an effective short-term policy Follow-up studies that address this radical/incremental balance would also benefit from a better discrimination between research activities (exploration) and development activities (exploitation) (Garcia and Calantone 2003, Garcia, Calantone, and Levine 2003), a distinction that was difficult to draw in our empirical setting

To conclude, although our study is subject to several limitations, we believe that the phenomenon of agreement portfolios and the managerial question of how to organize the portfolios according to the firm's strategic objectives form an important yet understudied research area Our findings indicate that a portfolio perspective contributes to the understanding of innovation in TI markets

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When Is a Preannounced New Product Likely to Be Delayed?

Consider that a firm announces a deadline for a new product introduction Conditional on such a preannouncement, how must an external observer evaluate whether the product will be delayed beyond that deadline? Using data collected from managers in the computer hardware, software, and telecommunications industries, the authors present an analysis that demonstrates that delays in new product introductions beyond preannounced deadlines can be jointly explained by factors related to (1) the firm's motivations to delay the product, (2) the presence of constraints that prevent delay (or the availability of opportunities to delay the product), and (3) the firm's abilities pertaining to product development

A new product preannouncement (NPPA) is a formal, deliberate communication that releases information about a product well in advance of the product's actual introduction (Eliashberg and Robertson 1988, Koku 1998) Preannounced products are often delayed, particularly in technology-intensive industries For example, as many as 47% of 123 key software products that were announced before introduction during 1985–1995 were delayed by more than three months (Bayus, Jain, and Rao 2001) According to the Standish Group's 1995 survey of 8000 U S -based software projects, 84% did not finish on time, on budget, or with all features installed (Hoch et al 2000) Furthermore, more than 30% of the projects were cancelled before completion

When a product is preannounced, delays in introduction can cause a slew of problems for partner firms and customers Delays can also hurt the announcing firm Hendricks and Singhal (1997) study 101 firms that did not meet product introduction deadlines and find that delay announcements, on average, decreased the firms' market value by 5 25% (or, equivalently, by a substantial $119 3 million, measured in 1991 dollars)

However, NPPAs can also be beneficial They can advertise a firm's presence at the cutting edge of technology, enable customers and partners to prepare for the product, and provide information to the stock market Preannouncements can also promote social welfare and increase competition (Fisher, McGowan, and Greenwood 1983, Landis and Rolfe 1985)

The phenomenon of product introduction delays beyond preannounced deadlines has attracted attention across managerial, research, and policy arenas The following question is of particular interest From the perspective of an observer outside the preannouncing firm (e g , a customer, a manager in a firm that is a competitor or a partner/complementor), how should a preannounced product introduction deadline be evaluated? After all, talk is cheap

The literature lacks a systematic empirical analysis of the factors that lead to delays in the introduction of preannounced products, this article addresses the corresponding knowledge gap Adopting the perspective of an outside observer who has the task of evaluating an NPPA, we theoretically motivate and empirically validate a framework that explains delays in NPPA fulfillment *Ex ante*, such an accounting can help the outside observer arrive at more informed, better-reasoned conclusions about specific NPPAs *Ex post*, such an accounting can facilitate a richer interpretation of a delay that has already occurred

In constructing the framework, we draw from the motivation–opportunity–ability (MOA) paradigm that has been employed in other contexts (e g , Heer and Poiesz 1998, MacInnis, Moorman, and Jaworski 1991) We demonstrate that a robust accounting for product delays beyond the preannounced introduction date must incorporate explanatory variables related to motivation (i e , whether the managers in the firm *want* to introduce the product on time), opportunity (i e , whether certain forces *constrain* managers from delaying the product), and ability (i e , whether the firm and its managers are *capable* of introducing the product on time)

We do not focus here on either the motivations for preannouncements or the decisions regarding the lead time to product introduction (i e , the length of time between the date of the preannouncement and the promised introduction date) Rather, our focus is on explaining product-launch delay beyond the preannounced deadline, conditional on the preannouncement being made This approach is particularly appropriate from our adopted perspective of the outside observer

We first synthesize existing perspectives about NPPAs and then present a conceptual framework and describe the survey methodology We subsequently discuss the empirical findings and the limitations of our study

Background

Researchers across disciplines have studied issues related to NPPAs, for example, the issue of whether a firm should pre-

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announce has been considered from both analytical (Farrell and Saloner 1986) and empirical (Eliashberg and Robertson 1988) perspectives Farrell and Saloner (1986) argue that NPPAs can halt competitive momentum in network-based markets Eliashberg and Robertson (1988) enrich this perspective by establishing detailed conditions that guide the NPPA decision For example, they demonstrate that large firms may hold back from NPPAs on account of antitrust concerns and potentially significant cannibalization of existing products Strategic motivations may drive the NPPAs of yet other firms, the credibility of the preannouncements may depend on the presence or absence of a credible threat to entry (Desai and Srinivasan 1994), the existing reputation of the announcing firm (Levy 1995), and the development costs of the announcing firm (Bayus, Jain, and Rao 2001)

If a firm preannounces, when should it do so? Lilly and Walters (1997) and Kohli (1999) examine this issue of NPPA timing by providing a propositional inventory that describes how factors related to competitors, products, buyers, and the preannouncing firm can influence such timing Kohli empirically illustrates how purchase patterns, customer learning needs, and expected competitive reactions influence such timing

Finally, what are the effects of NPPAs and the implications of not living up to them? In this context, Robertson, Eliashberg, and Rymon (1995) examine the likelihood, aggressiveness, and path of a firm's reaction to a competitor's NPPA In addition to demarcating a range of industry- and signal-related factors that guide such reaction (e g , the firm's commitment to the product category, available patent protection), Robertson, Eliashberg, and Rymon find that firms may respond to NPPAs that use marketing-mix instruments other than the product itself Koku (1998) examines stock market reactions to NPPAs and finds that the stock market reacts positively to new product announcements accompanied by detailed information releases rather than NPPAs Hendricks and Singhal (1997) determine that not living up to NPPAs can erode market capital [1]

The existing literature provides insights into the existence, nature, and effects of NPPAs However, from the perspective of an outside observer, a systematic examination of factors that may cause a new product to be delayed beyond the preannounced deadline is missing in the literature Research on this issue represents a logical extension of existing work in the area

Conceptual Framework

Multiple factors can cause a product to be delayed beyond a preannounced deadline First, research on new product development has focused on how the lack of firm-level abilities can delay product introductions These studies have highlighted the role of technical problems related to design and development, poor management of the development process, and the lack of resources and senior management support Suggested remedial measures include the implementation of cross-functional teams and concurrent engineering and the allocation of adequate managerial resources toward development (e g , Cooper 1995, Gupta and Wilemon 1990, Hendricks and Singhal 1997) The firm's internal capabilities play an important role in determining whether a firm conforms to a preannounced deadline, however, they provide only a partial accounting of delays, particularly when the introduction has been preannounced

Irrespective of a firm's ability to introduce a product on time, it may be motivated to delay a preannounced product For example, the NPPA may be designed to preempt or respond quickly to a competitor's initiative In such cases, the NPPA may aim more to prevent customer defection in the short run by promising an upgraded product in the near future When the threat from the competitor has been successfully eliminated, the incentive to introduce the product on time is diluted

Finally, even when a firm is motivated to delay product introduction beyond a preannounced deadline, the firm's key customers and partners, who may be adversely affected by such delays, may constrain the firm to introduce the product on time (i e , pressure from these entities may shrink the opportunity for delay) These entities often schedule their own activities and initiatives on the basis of the expectations set up by the preannouncement Consequently, from their perspective, delays beyond preannounced deadlines can be inconvenient and expensive

Taken together, these arguments suggest that any explanation of delays in the introduction of preannounced products must accommodate the announcing firm's ability to introduce the product on time, its motivations to delay the product, and the presence or absence of opportunities to delay the product Such MOA triads have been applied in the consumer behavior literature to study how consumers process information (Andrews 1988, Batra and Ray 1986, Heer and Poiesz 1998, MacInnis and Jaworski 1989, MacInnis, Moorman, and Jaworski 1991) The motivation–ability framework has also been applied in the marketing and strategy literature to study organizational behaviors (e g , Chen and Hambrick 1995, Grewal 2001)

We selected specific constructs related to the framework as follows We began with a large set of variables based on the existing literature on product delays in general, and we then winnowed down the list to focus on a smaller set of salient variables We achieved this refinement in two ways First, we examined the literature thoroughly to identify and include constructs that were particularly salient for preannounced products Second, we conducted in-depth, in-person interviews with eight managers from firms across the computer hardware, software, and telecommunications industries The interviews provided a practical perspective on product delays in the context of NPPAs and helped us demarcate key constructs related to the announcing firm's motivations, opportunities, and abilities Figure 1 describes the resulting conceptual framework

Note that some of the antecedent variables in Figure 1 may influence (1) the time to actual launch from the date of the preannouncement (e g , t_1) and (2) the preannouncement lead time (i e , the gap between the date the preannouncement is made and the promised product introduction date, e g , t_2) The difference between the two time durations ($t_1 - t_2$) constitutes the product introduction delay, which may be negative if the product is launched before the preannounced deadline Figure 1 thus presents what may be considered a reduced-form model that is particularly relevant from an outside observer's perspective, because such an observer can evaluate an NPPA only after the introduction deadline is announced Stated differently, we treat the preannouncement date as exogenously determined [2]

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[1] Heil and Walters (1993) use a signaling framework (e g , Heil and Robertson 1991, Spence 1974) to examine incumbent reactions to new product introductions (rather than to NPPAs)

Factors Related to Motivation

Competitive objectives Firms frequently employ NPPAs to communicate plans for a retaliatory move against a competitor and to preempt competitive entry (Rabino and Moore 1989) Kohli (1999) notes that approximately 25% of the preannouncements in his study were made in response to a competitor's announcement or product introduction Such NPPAs can deliver significant competitive advantages (e g , IBM's NPPA about its disk-drive system for storing data on mainframe computers flattened the sales of the industry leader EMC) (Lohr 1994)

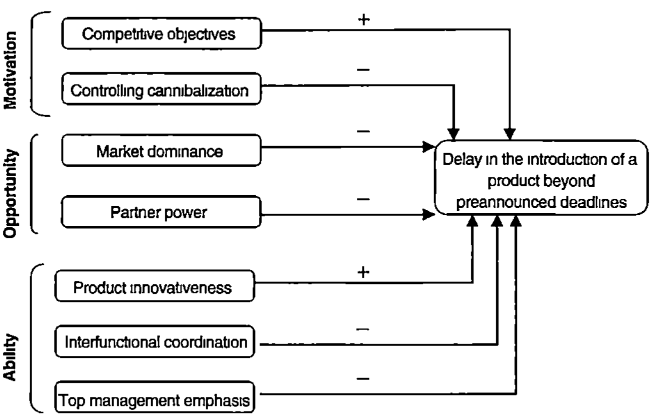
A new product is likely to be delayed when it is preannounced with competitive objectives For an NPPA to hinder the momentum of a competitor's product, it must be communicated shortly before or after the competitor's own announcement or introduction In a firm's haste to act, it may communicate either a new product concept that is at an early stage of development or plans for a product that has not yet been conceived in sufficient detail [3] In each case, there is tension between high levels of uncertainty and the need to convince the market immediately that the firm will have a competitive offering available in the near future Furthermore, announcements made in reaction to those of competitors are more likely to be "smoke," that is, designed expressly to forestall any deleterious defection of customers and partners while the firm considers a more deliberate response

Even if a new product preannounced in a preemptive or reactive context has been under sustained development, it may need major changes to match or exceed the competitor's announced or introduced offering Consequently, market introduction may be delayed On the basis of these arguments, we propose the following

> H_1 As the degree to which a firm uses an NPPA as a competitive tool to preempt or react to a competitor's move increases, the delay in introducing the preannounced product increases

Controlling cannibalization New product sales can come from market expansion (i e , demand stimulation), sales of competing products, or cannibalization of sales of

FIGURE 1
Explaining Product Introduction Delays Beyond Preannounced Deadlines: An MOA Framework



the firm's existing products (Kohli 1999) When a new product is expected to cannibalize the sales of existing products, customers may wait for the preannounced product rather than purchase existing offerings This can reduce cash inflow, thereby placing the firm in a dire financial situation

The willingness to cannibalize existing products or organizational routines has sometimes been viewed as a desirable trait that promotes radical product innovation and long-term corporate success (e g , Chandy and Tellis 1998, Copulsky 1976, Kerin, Harvey, and Rothe 1978) In such cases, firms must carefully plan for cannibalization after taking multiple factors into account, including the difference in the profit margins of the old and new products

In general, though, the fear of cannibalization can discipline firm behavior with respect to NPPAs The fear of cannibalization can discourage a firm from even undertaking NPPAs (Eliashberg and Robertson 1988) Furthermore; in designing NPPAs, firms that fear cannibalization may ensure that the time between the NPPA and the proposed product introduction deadline is not substantial (Kohli 1999, Lilly and Walters 1997) Finally, when a firm has preannounced, it may believe that it is pressured to meet the preannounced deadline to avoid a situation in which consumers waiting for the product continue to postpone purchases, thereby constricting the firm's cash flow For example, Osborne Computer released a premature NPPA for its next-generation computer, the NPPA dried out cash inflow from existing computer lines and led Osborne to file for bankruptcy (Casselman 1991) On the basis of these arguments, we propose the following

> H_2 As the potential for cannibalization of the announcing firm's existing products increases, the delay in introducing the preannounced product decreases

Factors Related to Opportunity

Market dominance Dominant firms are held to higher corporate standards, and they value positive public relations and their reputation as important assets A dominant firm's delayed product introduction is likely to have strong impacts on customers and partners/complementors The resulting criticism can damage the reputation of the dominant firm

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[2] We thank an anonymous reviewer for this interpretation

[3] For example, consider Airbus's NPPA about its double-decker 555-seat A3XX jetliner The A3XX was to compete with Boeing's 747-400 Jumbo, which dominates the long-range, large-carrier market Boeing responded by preannouncing a 747X Stretch version with a lengthened upper-deck hump, sleeping berths over coach class, and high-quality in-seat entertainment Boeing then withdrew the plans for the 747X in favor of a smaller, near supersonic passenger aircraft the Sonic Cruiser Plans for this plane, too, are now on hold

Dominant firms with significantly delayed products are also more likely to attract antitrust attention from the Federal Trade Commission and other regulators[4] For firms such as IBM and Microsoft, such legal entanglements can absorb precious resources, including managerial attention, and can adversely affect their leadership and innovativeness Consider this description of IBM's predicament during the early 1970s, when government litigation against the firm was at its height "At IBM, people got afraid to move They were afraid to take risks" (BBC News 1999) Likewise, Nicholas Katzenbach, the former U S attorney general who led IBM's defense, noted that during the 1970s, senior executives at IBM carried two briefcases, "one for company business and one for the lawsuit" (BBC News 1999)

The immediate effects of NPPAs may well be stronger for dominant firms A dominant firm's NPPAs can effectively evoke consumers' fears, uncertainties, and doubts and can slow the momentum of a popular rival product (Johnston 1995) However, significant delays in product introduction can hurt the dominant firm's strategic position in the long run, because the only way a firm can trick the marketplace and get away with delayed products in the short run is by cashing in on some of its existing (good) reputation (Levy 1995)

Finally, there is empirical support for the notion that dominant firms tend to be conservative and to conform to the rules in the context of product introduction For example, large firms are less likely to broadcast NPPAs because they are sensitive to potential antitrust action on account of "market overhanging" (i e , preannouncing a product far in advance, with the deliberate intent of injuring competitors' sales) (Eliashberg and Robertson 1988) Likewise, it has been established that significant product introduction delays (three months and more) are negatively and significantly related to firm size (Bayus, Jain, and Rao 2001) On the basis of these arguments, we propose the following

> H_3 As the market dominance of an announcing firm increases, the delay in introducing the preannounced product decreases

Partner power Partner power refers to the degree to which partners can penalize the offender when an NPPA deadline is not fulfilled Such punishment can include negative word of mouth, reduced cooperation, and even termination of the relationship

Delayed product introductions are particularly harmful for the firm's partners in high-technology industries When changes in technology are rapid and product life cycles are short, complementary products from partners are often developed in parallel with the focal product and are based on the projected timing and features of the focal product The NPPAs can encourage partners to undertake the risks involved with such concurrent development When the preannounced product is delayed, the expected cash flows of partner firms may not materialize, because their products may not have independent markets For example, when an operating system is late, application software developers may need to stretch budgets for 6 to 18 months or even abandon projects altogether (Scannell and Johnston 1994) The systems integrator and Sun Microsystems reseller DigiNet ceased operations partly because of the inability of Sun's Java programming language to deliver on its promises in a timely manner (Gage and Foley 1998)

Complementary products' added value to the focal product can endow partners with the potential ability to punish the offending focal-product producer, however, that ability is likely to be moderated by the differential distribution of power and mutual dependence of the parties This ability to punish is curtailed when (1) the market for complementary products is competitive, (2) the partners are relatively small, (3) there are few other ways to get to market apart from associating with the focal product, and/or (4) the partners have incurred substantial fixed costs specific to the focal-product producer In such cases, the focal-product producers are less likely to live up to their commitments, however, in other cases, the partners may wield significant influence over the announcing firm For example, the influence of partners may be enhanced when the relationship between the announcing firm and its partners is guided by strong relational norms that curtail opportunistic behavior (Heide and John 1992) In other cases, the announcing firm may itself be tightly linked to its partners through either idiosyncratic investments that are difficult to deploy in other relationships or contractual terms that constrain activities related to that relationship (Anderson and Weitz 1992) In these conditions, the adverse consequences of delaying the product are likely to be significant, and the announcing firm will try to meet preannounced deadlines[5] On the basis of these arguments, we propose the following

> H_4 As partner power increases, the delay in introducing the preannounced product decreases

Factors Related to Ability

Product innovativeness Product innovativeness reflects the degree to which new technology and advanced features are embedded in a product Two innovation dimensions are relevant here the technology dimension and the market/customer dimension (Abernathy and Clark 1985, Chandy and Tellis 1998)

Product innovativeness increases uncertainty in the product development and marketing contexts and can delay product introduction First, in the development context, innovative products are associated with increased technological risk (i e , the firm may not be able to effectively design and efficiently manufacture the product) To control technological risk, firms need to sequence and carefully manage complex development processes, but this can be a challenging task (Krishnan, Eppinger, and Whitney 1997)

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[4] The ruling of Judge Stanley Sporkin in Civil Action No 94-1564 (*United States of America v Microsoft Corporation* 1995, § V B 3) offers evidence of a dominant firm being scrutinized for the practice of aggressive preannouncement "Microsoft has a dominant position in the operating systems market, from which the [g]overnment's expert concedes it would be very hard to dislodge it Given this fact, Microsoft could unfairly hold onto this position with aggressive preannouncements of new products in the face of the introduction of possibly superior competitive products "

[5] Although we initially included customer power as an explanatory variable in the model, we dropped it on account of measurement problems

In addition, firms may reduce technological risk by designing and rigorously testing new product platforms, seeking new technology partners, and building new knowledge related to the product These initiatives can take considerable and unpredictable amounts of time Therefore, increased technology uncertainty can prolong development and delay the product beyond the promised deadline

Second, innovative products are associated with increased market risk (the risk that the product may not find market acceptance even after successful design and manufacture) Firms typically preannounce innovative products early to advance consumer learning (Eliashberg and Robertson 1988) and to build a sense of familiarity that diminishes resistance to the unknown and unfamiliar (Lilly and Walters 1997) Although preannouncement of an innovative product may help prepare the marketplace for change, it is frequently difficult to control the pace of the development process and, accordingly, to predict the product's introduction date with confidence Given that uncertainty is gradually clarified as the firm progresses through the development process, deadlines promised in NPPAs for innovative products are more likely not to be fulfilled On the basis of these arguments, we propose the following

> H_5 As the innovativeness of the preannounced product increases, the delay in introducing the preannounced product increases

Interfunctional coordination Interfunctional coordination refers to the extent to which the work activities of different functions are logically consistent, coherent, and mutually coordinated with respect to preestablished performance objectives (Cheng 1983, Wood and Tandon 1994) Interfunctional coordination has been associated with greater new product success and a stronger market orientation (Cooper 1984, Kohli and Jaworski 1990)

New products are frequently delayed by a lack of coordination both among members of the core product development team and between the product team and functional areas such as marketing and manufacturing (Jenkins 1988) Product teams often accuse functional areas of being overoptimistic about development outcomes and timelines and of disseminating news without careful consultation with developers (Kay 1992) Kay (1992) cites the example of Monarch Computer, which promised its textile industry customers a six-month delivery time frame for a new knitting machine The director of software development noted, "they were only concerned with selling the machine itself, and it didn't even occur to them that it may be difficult to write the (software) system that drives the machine within the six months" (Kay 1992, p 81) However, management and marketing had their sides of the story as well They complained that developers kept working on the product until they were completely satisfied, without realizing the urgency of introducing a product on time to beat competition

Cross-functional teams are increasingly used in new product development The members of such teams have collective knowledge that cannot be effectively held by individual members, therefore, coordination is crucial if the embedded knowledge possessed by team members is to be translated into *embodied* knowledge that is resident in the product (Madhavan and Grover 1998) Cross-functional product development teams can support timely product introductions (Cooper 1995), however, for such teams to work well, effective interfunctional coordination is required On the basis of these arguments, we propose the following

> H_6 As the interfunctional coordination in the firm increases, the delay in introducing the preannounced product decreases

Top management emphasis Top management shapes an organization's values (Kohli and Jaworski 1990), and its emphasis on timely product introduction can influence the attitudes of lower-level managers toward delay in product launch If top management believes that a delay in introducing a preannounced product is a mistake that the firm does not want and cannot afford to make, that message would influence the entire product development process, including decisions related to NPPAs Living up to public commitments would then be a priority for the firm

Senior managers at many firms work to define and improve the product development process At EDS, Dick Brown, the chief executive officer, who inculcated a culture of living up to internal and external commitments, noted "It's easier to miss a budget than a commitment, because a budget is just an accumulation of numbers A commitment is your personal pledge to get the job done And that's how we strive to behave as a team" (*Fast Company* 2001, p 106) At EDS, the company's leaders know exactly when a client's expectations are not being met At another consumer product firm, top management established an informal but widely known two-year deadline for bringing new products to market Managers who consistently met these deadlines were promoted[6]

When top management sets an appropriate tone, lower-level managers strive to introduce the preannounced product in a timely manner On the basis of these arguments, we propose the following

> H_7 As top management's emphasis on delivering a preannounced product on time increases, the delay in introducing the preannounced product decreases

Methodology

Data Collection

The unit of analysis is an NPPA in the computer hardware, software, and telecommunications industries These industries preannounce new products more often than other industries Furthermore, the focus on a limited set of industries ensures sufficient within-sample consistency Product development processes and environmental factors vary widely across industries, thus, if we studied disparate industries, we would need to control for the substantial variances Our focus on a set of allied industries reduces the generality of the results to an extent, however, we are reasonably assured that the broad parameters related to development processes and the competitive environment are consistent across the studied firms This enhances our confidence in the results

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[6] We thank Abbie Griffin for suggesting this example

As a first step, we conducted in-depth, in-person interviews with eight managers from firms across the chosen industries The interviews provided a practical perspective on NPPAs and product delays and helped segregate the antecedents of greatest importance We acquired a list of potential respondents, including senior marketing executives in the industries, from CorpTech We restricted participants to strategic business units (SBUs) with 250 or more employees This ensured, by design, that we did not include small divisions in the surveys, which further enhances the comparability of results The sampling frame covered 1252 potential respondents

Following previous work in the area (e g , Eliashberg and Robertson 1988, Kohli 1999, Robertson, Eliashberg, and Rymon 1995), we used key informant reports as the source for data Typically, the head of marketing was the key informant Most potential respondents (more than 80%) were at the level of director or higher The questionnaire also requested a self-report of the respondent's level of knowledge about the NPPA activities of their SBU The sample reported a high average score of 6 4 on a seven-point scale Thus, we are reasonably confident that the respondents were able to comment authoritatively on the issues of interest

The survey and a personalized cover letter were mailed to potential respondents We assured potential respondents that their identities would remain anonymous and that we would only report aggregated results Approximately ten days later, the first reminder letter was mailed Approximately five weeks after the first copy of the survey was mailed, the second reminder letter and a new copy of the survey were mailed to nonrespondents The projected incentive for completing the survey was that the research project would help advance managerial knowledge and guide managerial initiatives related to NPPAs, we also promised respondents a copy of the tabulated results, aggregated to ensure that respondents could not be identified From 1252 mailings, 26 were returned because of inaccurate addresses or absence of the addressees, which reduced the frame to 1226 A total of 201 surveys were returned, for an overall response rate of 16 4% Among the 201 returned surveys, 82 had no NPPAs in the past two years, and 6 were unusable because of missing input Thus, we used data from 113 respondents for the final analysis

This response rate is reasonable, and even encouraging, for the following reasons First, the survey covered questions about the SBUs' NPPAs and product-delay times In general, answers to these questions are confidential and/or sensitive Second, the targeted respondents were typically heads of the marketing function (marketing vice presidents or marketing directors), who usually operate under significant time constraints (Calantone and Schatzel 2000)

To check for response bias, we classified the data into two groups on the basis of survey-return dates We classified responses received before six weeks from the first mailing date as early responses ($n = 80$) and those we received later as late responses ($n = 33$) We compared response means for the dependent and the explanatory variables across early and late respondents, with the exception of the partner-power construct, the means were statistically indistinguishable ($p <$ 1), suggesting the absence of any significant response bias Consequently, we pooled the data for further analysis

Measurement

We asked respondents to provide extensive data for the most recent NPPA in the previous two years The dependent variable measures the length of delay in the introduction of a preannounced product, which is the difference between the product introduction date specified in the preannouncement and the actual introduction date To measure the dependent variable, we asked respondents to provide information about whether the product was delayed beyond the preannounced introduction date If a delay did occur, we asked respondents to report the length of delay beyond the preannounced deadline (in weeks)

We generated items for measuring the independent variables on the basis of the existing literature, field interviews with eight managers, and the theoretical antecedents to the proposed hypotheses Whenever possible, we used scales from the existing literature, however, we specifically constructed some scales for this study We pretested the items in several steps First, several doctoral students reviewed the items for content and readability Second, six academic experts critically evaluated the items Finally, eight managers who were knowledgeable in NPPA activities provided feedback We modified items on the basis of feedback from the different sources

We established the reliability and validity of the measures using the standard procedure that Gerbing and Anderson (1988) recommend We performed a Varimax-rotated principle component analysis to investigate the unidimensionality of each construct We deleted items with significant cross-loadings The results are displayed in Table 1 Note that despite the relatively large number of constructs, there is a clean separation between the resulting seven factors (we did not prespecify the number of factors) Because of the size of the sample ($n = 113$), we did not conduct confirmatory factor analysis Nonconvergence and improper solutions are likely to occur when sample sizes are smaller than 150 (Gerbing and Anderson 1988)

The specific items used, their sources, and the Cronbach alphas associated with their respective scales are detailed in Appendix A All the included items demonstrated acceptable item-to-total correlations The alphas for all scales compare favorably with the 7-and-greater criterion that Nunnally (1978) suggests, except for the scale that measures partner power At 67, Cronbach's alpha for this scale is close to Nunnally's criterion There are some limitations to our scales, particularly the new ones we developed for this study We expect that they will be expanded and refined in further research

Analysis and Results

Approximately 70% of respondents encountered some delay in introducing preannounced products For delayed products, the average delay was 9 3 weeks (minimum 1 week and maximum 52 weeks) These findings are broadly consistent with those of Kohli (1999)

For a firm that introduces the product on time, the dependent variable (i e , number of weeks the product is

TABLE 1
Rotated Component Matrix of Item Loadings for Independent Variables

		Components						
Construct	**Items**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Competitive objectives	OBJ1	**.813**	-.052	-.017	-.072	.061	.090	.000
	OBJ2	**.764**	.204	.152	.002	-.084	.043	-.025
	OBJ3	**.900**	.050	-.050	-.015	-.041	-.044	.070
Controlling cannibalization	CANN1	.039	**.766**	.124	-.066	-.122	-.098	.097
	CANN2	.034	**.778**	.067	.104	.023	-.091	.060
	CANN3	.122	**.751**	-.227	-.008	.042	.050	-.131
Market dominance	DOMIN1	.050	.002	**.732**	.085	.311	.281	.025
	DOMIN2	.149	.037	**.834**	-.094	.126	.051	.192
	DOMIN3	-.101	-.030	**.822**	-.214	.131	-.038	-.099
Partner power	POWER1	.053	.022	-.075	**.874**	.071	-.124	-.043
	POWER2	-.154	.017	-.134	**.788**	-.149	-.124	-.095
Product innovativeness	INNOV1	.080	-.329	.035	-.076	**.593**	.191	.123
	INNOV2	.075	.244	.192	.057	**.694**	.189	.190
	INNOV3	-.124	-.048	.180	-.033	**.665**	.137	.225
	INNOV4	-.042	.016	-.009	-.019	**.783**	.019	.008
	INNOV5	-.016	-.057	.272	-.015	**.713**	.011	.138
Interfunctional coordination	COORD1	.220	-.060	-.032	-.219	.214	**.674**	.294
	COORD2	.041	.107	.048	-.057	.178	**.655**	.443
	COORD3	.012	-.096	.093	-.040	-.010	**.688**	.240
	COORD4	-.057	-.098	.093	-.076	.157	**.733**	-.073
Top management emphasis	EMPH1	.001	-.038	.004	-.137	.071	.110	**.866**
	EMPH2	.047	.186	.117	.193	.099	.238	**.777**
	EMPH3	-.086	.137	.040	-.101	.283	.041	**.709**
	EMPH4	.083	-.227	.023	-.010	.057	.117	**.827**
	EMPH5	.035	.026	-.044	-.202	.448	.262	**.585**

Notes: Extraction method is principal component analysis. Rotation method is Varimax with Kaiser normalization. We did not prespecify the number of factors. For items, see Appendix A.

delayed beyond the preannounced deadline) is zero. Therefore, the dependent variable is left-censored (i.e., there is a mass point at zero representing firms that introduced the product on or before the preannounced deadline). In such cases, ordinary least squares regression yields estimates that are inconsistent and biased toward zero (Judge et al. 1985); instead, a Tobit model provides the appropriate estimation approach (Tobin 1958). We represented independent variables with their average item score.

Before estimation, we tested the data for multicollinearity. Diagnostics indicated that the variance inflation factors associated with each variable were much less than 2. Furthermore, none of the condition indexes associated with the eigenvalues of the variable matrix was greater than 20. In conjunction with the separation of constructs demonstrated in Table 1, these tests imply the absence of significant multicollinearity problems (Johnston 1991, p. 250).

An initial estimation that included dummy variables to capture potential industry-specific effects revealed no significant variation by industry; thus, we pooled the data for the final estimation. For firms with positive delay in product introduction, both a visual inspection of the residuals and a formal Glesjer test did not signal the presence of significant heteroskedasticity (Johnston 1991). We then obtained maximum-likelihood estimates using TSP 4.5. We initially included two variables (technology uncertainty and market uncertainty) to control for the possible influence of the dynamic nature of the technological environment and of rapid changes in product requirements and/or definition on product introduction times. Neither of the variables was significant; thus, we dropped them during the final estimation.

Results

Table 2 presents the results for the Tobit estimation. In the context of motivation, as we hypothesized, objectives related to competitive reaction or preemption are positively related to delays in product introduction ($p = .016$). Contrary to the proposed hypothesis, motivations related to the control of cannibalization are also positively related to delay ($p = .035$). We advance explanations for this unexpected finding in the "Discussion" section. In the context of opportunity, we find that delays are reduced when the firm is dominant in its market ($p = .084$) and when partner power is high ($p = .083$). Finally, in the context of ability, as we hypothesized, greater product innovativeness is positively associated with delay ($p = .04$), whereas greater interfunctional coordination and a higher level of top management emphasis on timely introduction are negatively associated with delay ($p = .000$ and $p = .016$, respectively).

Discussion and Implications

This article addresses the question, Conditional on a preannouncement being made, how must an outside observer evaluate a firm's preannounced product introduction deadline? We demonstrate that to answer this question, factors related to (1) the firm's motivations to delay the product, (2) the presence or absence of opportunities to delay the product, and (3)

TABLE 2
Factors Contributing to Product Introduction Delay: Tobit Results

Predictors	Estimate	Standard Error	p-Value	Support for Hypothesis
(Constant)	21 102	7 849	007	—
Competitive objectives (H_1)	455	189	016	Yes
Controlling cannibalization (H_2)	468	223	035	Significant, but in opposite direction
Market dominance (H_3)	– 442	256	084	Yes
Partner power (H_4)	– 615	355	083	Yes
Product innovativeness (H_5)	618	212	040	Yes
Interfunctional coordination (H_6)	–1 116	247	000	Yes
Top management emphasis (H_7)	– 413	172	016	Yes

Notes N = 113 Positive delay N = 80 (70 8%), Schwarz Bayesian information criterion = 334 96, and log-likelihood = –316 05

the firm's ability to deliver the product on time must be considered We discuss our findings next, beginning with the unexpected finding that increased cannibalization potential is associated with increased delay in product introduction

Findings

The positive link between cannibalization potential and increased delay When a new product that is expected to replace an existing product is preannounced, customers anticipating the former will postpone purchases of the latter Ostensibly, managers who seek to avoid such delayed sales will strive to introduce the new product on time Contrary to our hypothesis, though, we find that increased potential for cannibalization is associated with *increased* delay in product introduction beyond preannounced deadlines

The following explanations are consistent with our finding First, when existing products are performing well, managers may seek to postpone the uncertainty caused by their replacement with new, relatively untested products Such an aversion to the potential downsides of replacement may be more pronounced as the product introduction deadline approaches Increased aversion of this kind to potential losses in the short run is consistent with the behavioral phenomenon of myopic loss aversion (Benartzi and Thaler 1999)

Second, the new product may present a less attractive profit proposition because it may (1) involve higher variable costs than anticipated and thus cannot quickly reap economies of scale in production, (2) involve substantial unforeseen expenditures related to advertising, consumer education, and other aspects of information dissemination, and (3) need to be priced lower than expected to penetrate the market sufficiently even while embedding more sophisticated and expensive materials and technologies Managers and design engineers who supervise early stages of product development often focus more on issues related to innovation and technology and do not pay adequate attention to the overall economic case for product development Furthermore, while focusing on the product under development, managers may tend to ignore firm-level costs and implications related to the product line and customer mix (Kaplan 1990)

The economic disadvantages, both perceived and real, associated with switching to the new product are clarified and magnified as the product introduction deadline approaches Under these conditions, the existing product increasingly takes on the characteristics of a relatively safe bet In response, managers tend to delay the new product and treat it as an option, to be exercised at an appropriate time in the future On the basis of these arguments, and consistent with the argument of Christensen (1997), established firms might fear cannibalization and thus delay the introduction of new technologies

These arguments are supported by firms' real-world experiences For example, fearing cannibalization, IBM often delayed or otherwise stymied innovative technologies and products that were ready for market entry (McGrath 2001) Although IBM developed reduced instruction set computing technology, it delayed implementing it and lost ground to competing computer makers Likewise, IBM intentionally reduced the capabilities of PCjr to avoid cannibalizing the personal computer market Similarly, in the early 1980s, IBM hesitated to push into desktop computers and workstations because it feared losing business on its high-margin mainframe computers This was a lapse of great consequence that opened up the markets to new and aggressive competitors, a lapse that hurts IBM to this day

Among the considered antecedents to product delay, note that such aversion to risk associated with the replacement of the tested and familiar with the new and unfamiliar is in a direction opposite to the stated hypothesis and works in favor of increased delay in the case of fear of cannibalization Among other antecedents, consistent with the corresponding hypotheses, such aversion to risk, in general, works in favor of a timely introduction of the preannounced product For example, managers who are averse to risk would work toward a timely introduction when they fear scrutiny on account of market dominance, are apprehensive of backlash from partner firms, or seek to keep top management satisfied[7]

Findings related to the MOA framework The results suggest that to obtain a relatively complete accounting of factors that delay preannounced products, factors related to each element of the MOA framework must be considered First, in the context of motivation, not every preannouncement is backed up with honest intentions For example, firms may not intend to fulfill NPPAs when they seek to protect the substantial cash inflow from existing products or when they announce a new product to react to or preempt a competitor Second, constraints from the strategic partners and the environment can discipline the announcing firm's product introduction plans and increase the likelihood of timely introduction Third, some delays in product introduction may derive from the true inability of the announcing firm to uphold its promises made in good faith For example, the challenges encountered in the development of innovative products are difficult to anticipate *ex ante* and can be underestimated in the excitement and can-do spirit associated with new product and NPPA activity

Managerial and Policy Implications

The findings offer guidelines for outside observers who seek to evaluate NPPAs, for managers who design NPPAs, and for policy planners who seek to reduce the anticompetitive effects of product-introduction delays beyond preannounced deadlines

NPAA evaluation From the perspective of an outside observer, a blind acceptance of product introduction deadlines in an NPPA can prove a costly mistake, many companies have suffered substantial financial losses while waiting for preannounced products, and some have gone out of business while doing so In response, though, observers of NPPAs in the field have tended to smother all NPPAs in a blanket of suspicion and to develop rather rough heuristics to deal with the problem For example, consider the reaction of a senior information technology manager (Brandel 1994, p 14) "Always wait until Version 1 1 or 1 2[,] the software version that ends with 0 is always deadly"

When outside observers integrate information about the factors related to all components of the MOA triad as demarcated in this study, they are in a better position to interpret and evaluate NPPAs and to arrive at more informed conclusions about how they should react

However, before evaluating the NPPA, outside observers must develop a keen understanding of the conditions that lead to the predictors themselves For example, consider the ability of partners to punish the announcing firm This ability might depend on the level of mutually embedded assets that the firm and the partners possess (the greater such embeddedness, the lesser is the ability of a partner to walk away and thus the lower is its ability to punish), the availability of other partners to switch to, and the degree to which product standards compel the partners to stick with the announcing firm After considering such conditions that relate to the predictors, observers can meaningfully judge the salience of each predictor in a specific context

When a high probability of delay is associated with an NPPA, observers can take steps in response As we subsequently describe, these steps vary according to whether the observers are managers in partner or complementor firms, managers in competing firms, or customers

Managers in partner or complementor firms are primarily concerned with reducing their exposure to delay First, these managers can avoid overcommitment by defensively scheduling projects that embed the preannounced product Second, they can seek more credible commitments for skeletal versions of the product from the announcing firm These versions may deliver lower functionality but can be introduced in a shorter time frame Third, they can coordinate with other partner firms to emphasize collectively the importance of meeting promised deadlines to the announcing firm Finally, in the absence of other recourse, they can plan around the preannounced product or switch to competing products

Managers in competing firms are primarily concerned with designing their business strategies to accommodate the moves of the announcing firm When these managers estimate that the focal firm is not likely to adhere to a promised product introduction deadline, they must avoid the tendency to overreact This does not imply that they must take no actions in response to the NPPA, rather, the nature and degree of their response must be carefully calibrated to accommodate the likelihood that the preannounced product either may be significantly delayed or may not even materialize For example, these managers may proceed with plans for developing a competing product to an extent, thus leaving further development and launch as options to be potentially invoked as the announcing firm clarifies its plans and intentions

A customer evaluating an NPPA can choose between adopting an existing product of the announcing firm (or of a competitor) and postponing the adoption decision (in which case either the preannounced product or any other product can be adopted at some future point) Much as complementor and partner firms do, customers must develop contingency plans in case the preannounced product is delayed and/or an appropriate substitute is unavailable Furthermore, customers must be particularly careful to avoid the sunk-cost fallacy (i e , a long wait for a preannounced product must not be used to justify a decision to wait even longer) Instead, customers must dispassionately evaluate the costs and benefits of waiting longer at periodic intervals

Designing an NPPA From the perspective of managers in the announcing firm, the results draw attention to conditions that can hinder the implementation of NPPAs according to preannounced deadlines For example, managers must think twice before instinctively reacting to competitors' NPPAs or aggressively preempting their forthcoming initiatives It may be tempting to forestall customer migration to the competitor in the short run, but such a move may have significant negative consequences in the long run, including dilution of the firm's marketplace credibility Likewise, even at an early stage of product development, managers must carefully evaluate whether they are ready to cannibalize a profitable, well-established product with a new product that may be technologically advanced but offers risky market prospects and is less profitable on a per-unit basis In addition, management should act more conservatively when deciding on introduction times for highly innovative products

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[7] Dominant firms may be less willing to delay preannounced products to avoid cannibalizing existing offerings, that is, the degree of dominance may moderate the estimated positive relationship between fear of cannibalization and introduction delay *Ex post*, we estimated a Tobit model with an interaction term to explore for such a moderating effect Although the interaction term was not significant, this moderating effect deserves closer attention in further research

Policy implications Although there may exist some policy benefits of ensuring that all new products are introduced according to preannounced deadlines, the delays that raise the greatest antitrust and anticompetitive concerns are those that are intentional or strategic (these broadly correspond to the motivation aspect of our analysis) However, as is shown in Appendix B, it is exceedingly difficult to distinguish between strategic and innocent delays There is an intense debate in the policy arena about whether all substantial delays in preannounced products should be treated equally under antitrust law, regardless of the announcer's intent (much like deceptive advertising under the Lanham Act) Our findings serve as a reminder that to arrive at a fair and balanced evaluation of delays in preannounced products, factors related to opportunity and ability must be considered in parallel with those related to motivation

Limitations and Further Research

First, although we believe that we targeted the correct key informants and that the informants provided relatively candid responses, extension of the analysis with independently collected information might lead to even greater confidence in the results Second, our set of key explanatory variables is not exhaustive For example, researchers might consider variables that represent customer power, development team motivation, and team leadership quality Whereas problems with measurement inhibited the consideration of customer power in the current analysis, this variable must figure in further research Third, the scales used must be refined and expanded in further research This is particularly true for the scale that measures partner power, which currently comprises only two items Fourth, we focused on a subset of high-technology industries to reduce interindustry confounds The study can be replicated in other settings

The following three themes present particularly worthwhile research opportunities in the area First is an explanation of the entire timeline of NPPA-related activities In communicating with the marketplace in the context of new product development, managers must decide (1) when the NPPA should be made (i e , the preannouncement date), (2) the gap between the preannouncement date and the promised product introduction date (i e , the preannounced lead time), and (3) the actual time of product introduction (this may partly be driven by factors outside of the managers' control) A single model that considers the drivers of each of these decisions and the relationships between these decisions appears to be an appropriate next step

Second is management of the release of information related to new product development Little is known about how a firm should manage the entire process of information exchange with the marketplace during the product development process For example, when and how must management inform the marketplace about delays on an ongoing basis? Such an incremental approach might help the firm better manage the expectations of various constituencies and, in turn, help it manage its own plans to accommodate such delays Furthermore, the design of innovative NPPAs deserves attention For example, NPPAs could provide a distribution of probabilities over a range of potential introduction times, as opposed to a single deadline

Third is the establishment of the timeliness–quality trade-off Because product introductions tend to be well-defined public acts, research has focused on issues related to the timing of new product initiatives However, firms can often trade off timeliness against quality (e g , it may be possible to introduce a product of marginal quality on time) When the focus is solely on introduction timing, the issue of *what* is being introduced into the marketplace is overlooked The relationships among NPPA deadlines, product introduction timing, and product quality require closer examination, a focus on timing alone tells but part of the story

APPENDIX A
Construct Items and Reliability

Construct	Scale Items	Source
Competitive objectives $\alpha = 79$	1 One objective of our last new product preannouncement was to respond to or to preempt a competitor's announcement/introduction of a new product 2 One objective of our last new product preannouncement was to discourage customers from switching to a competitor's product 3 Our last new product preannouncement was not related to competitors' new product introduction activity or plans (reverse coded)	New scale
Controlling cannibalization $\alpha = 70$	1 The sale of the preannounced new product may come from three sources (1) sales replacing our existing products, (2) sales displacing our competitors' products, and (3) sales from new customers Please estimate the percentage of the new product sales that was expected to come from a replacement of the existing product sales 2 The preannounced product was expected to greatly reduce the cash inflow from our existing products	Item 1 is adopted from Kohli (1999)

APPENDIX A
Continued

Construct	Scale Items	Source
	3 For the preannounced product, the possibility that customers might delay purchases of existing products was a serious concern	
Market dominance α = 78	1 Perceived dominance within the product category 2 Perceived leadership within the product category 3 Product category market share relative to that of the top four players	Items 1 and 2 are adopted and Item 3 is adapted from Eliashberg and Robertson (1988)
Partner power α = 67	1 Our complementors will need to rely on us in the future even if our relationship is not on the best terms (reverse coded) 2 Our complementors are very dependent on our product to serve their customers (reverse coded)	New scale
Product innovativeness α = 78	1 The preannounced product included innovative product features 2 High-quality technological innovations were embedded in the preannounced product 3 Compared to similar products developed by our competitors, the preannounced product offered unique features/attributes/benefits to customers 4 In terms of the embedded technology, the preannounced product was substantially more innovative compared to existing products available in the market 5 The preannounced product was only a minor product improvement/modification over existing products available in the market (reverse coded)	Items 1, 2, 3, and 5 are adapted from Sarin and Mahajan (2001)
Interfunctional coordination α = 75	1 The activities of the different functions are well coordinated 2 Management teams from different functions feel that the goals of their respective functional groups are in harmony with one another 3 We share resources with other functional units within the organization 4 Functional units in our organization often blame each other when products fail (reverse coded)	Item 2 is adopted from Jaworski and Kohli (1993) Item 3 is adopted from Narver and Slater (1990)
Top management emphasis α = 86	1 Top managers emphasize that delivering a new product on time is key to product success 2 Top managers clearly communicate the message that failure to deliver preannounced product on time causes great harm to the company's reputation and image 3 Top managers emphasize that we will not announce a product unless we are confident that it will be launched on time 4 Top managers here generally tolerate product delays well (reverse coded) 5 Delivering a product within the preannounced time frame is a top priority for our senior managers	New scale
Technology uncertainty (control) α = 75	1 In this product category, technology is changing rapidly 2 In this product category, technological changes provide big opportunities 3 In this product category, a large number of product ideas have been made possible through technological breakthroughs 4 In this product category, technological developments are rather minor (reverse coded)	Adopted from Jaworski and Kohli (1993)
Market uncertainty (control) α = 73	Indicate how quickly the following factors change 1 Customers' preferences for product features 2 Competitors' selling strategies 3 Competitors' products and models 4 Competitors' product pricing 5 Competitors' promotion/advertising strategies	Items 1, 2, 3, and 5 are adopted from Maltz and Kohli (1996)

Notes Except for Item 1 in the product cannibalization scale, we measured all items on a seven-point Likert-type scale (1 = "strongly disagree" and 7 = "strongly agree")

Appendix B
When Is a Delayed Product Vaporware?

Vaporware has been variously defined as the occurrence of substantial product introduction delays, the absence of promised features, or even the belief that a preannounced product will never ship However, the most common interpretation of vaporware pertains to the intent to deceive on the part of the announcing firm Vaporware is controversial precisely because of this, in the absence of a smoking gun (e g , a transcript of internal meetings or an exchange of e-mail) that captures such intent, the occurrence of vaporware is difficult to prove As Prentice (1996, p 1175) argues, delays in NPPA fulfillment may be perfectly innocent and are to be expected

> Of course, not all of the products will meet projected introduction dates Others may not carry all the promised features Others may not see the light of day After all, the design, testing, and manufacturing of high-tech products is a very complicated business Many projects are so very complex that it is nearly impossible to know when all the glitches will be worked out Not all delays are foreseeable Not all broken promises are broken intentionally

In the proposed MOA framework, the variables related to motivation are the ones that are most likely to be associated with vaporware However, even when variables related to motivation are relevant and must be accommodated by an outside manager in evaluating an NPPA, it is difficult to prove intent to mislead in a court of law To prove such intent, it is not sufficient to demonstrate, for example, that the NPPA was made in reaction to an announcement from a competitor Instead, it must be demonstrated that the information in the NPPA was not merely a reflection of the honest, if overambitious, intentions of the announcing firm but that the NPPA was explicitly designed for anticompetitive purposes

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Subin Im & John P. Workman Jr.

Market Orientation, Creativity, and New Product Performance in High-Technology Firms

The ability to generate and market creative ideas in new products (NPs) and related marketing programs (MPs) in response to changing market needs is key to the success of a firm. This research examines the mediating role of NP and MP creativity between market orientation and NP success. The authors investigate (1) whether market orientation facilitates or inhibits creativity, (2) whether creativity influences NP performance, and (3) how to define and measure creativity in the NP development and launch contexts. They use a two-stage sampling frame to collect 312 sets of responses from managers and NP team leaders and thereby address the potential for common method bias in measures of creativity and NP performance. The findings indicate that NP and MP creativity mediates the relationship between market orientation and NP success. The authors also show that the meaningfulness dimension, rather than the novelty dimension, of creativity is of greater importance in explaining the link between market orientation and NP success. The empirical results provide significant theoretical and managerial implications for NP strategy.

An accumulating body of research has established that market orientation leads to better performance in organizations (e.g., Jaworski and Kohli 1993; Narver and Slater 1990). Despite recent efforts to examine the mediating role of innovation as the missing link between market orientation and performance (e.g., Deshpandé, Farley, and Webster 1993; Han, Kim, and Srivastava 1998; Hurley and Hult 1998), there is no clear understanding of this link. A problem is that prior research has focused on the broad construct of innovation (often using the amount of innovations or patents) and has taken the strategic business unit (SBU) as its level of analysis. As Wind and Mahajan (1997) note, research in this area is confounded because of the equivocal definitions and measurements of innovation. This limitation is especially prominent when innovation is linked to performance, because innovation often implies a successful new product (NP) introduced into the market as its outcome. Another limitation is that a common method bias exists when one informant measures both independent and dependent variables.

Following Day and Wensley's (1988) source–position–performance framework, we propose that creativity is a mediator between market orientation and NP success (see also Han, Kim, and Srivastava 1998; Song and Parry 1997a). We use creativity (rather than innovation) as the positional mediator because it is a more concrete construct and, in general, has been viewed as a construct that precedes innovation. Specifically, Amabile and colleagues (1996, p. 1154) state "All innovation begins with creative ideas.... [C]reativity by individuals and teams is a starting point for innovation; the first is a necessary but not sufficient condition for the second." In addition, we use creativity in a more specified context (product development teams) and thus avoid overly general responses that can result when innovation is measured at the SBU level.

Compared with prior research on innovation and creativity, our research differs in four significant ways.[1] First, we examine market orientation as an antecedent of creativity, thereby providing empirical insight into the debate of whether market orientation facilitates or impedes innovation (e.g., Lukas and Ferrell 2000). Whereas the positive impact of market orientation on innovation is well documented (e.g., Han, Kim, and Srivastava 1998; Slater and Narver 1998, 1999), in Christensen's (1997) book, *The Innovator's Dilemma*, he argues that listening to customers may have a more negative effect on disruptive than sustaining technologies. Second, we examine the impact of creativity on NP performance at the team level. Although, in general, it has been supported that innovation is key to the growth and success of a firm (Andrews and Smith 1996; Sethi, Smith, and Park 2001), some researchers argue that imitation, rather than innovation, is more important (Nelson and Winter 1982; Schnaars 1994). Third, we develop a model that incorporates both NP and marketing program (MP) creativity as positional advantages. Fourth, we develop a measure of creativity that is specific to the new product development

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[1] Because of space constraints, this version of the article does not contain many details that were in a prior draft. For readers who are interested in these details, a longer version of the article is available on request from either author.

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(NPD) context We use a two-stage sampling frame to collect 312 sets of responses from managers and NP team leaders, thus addressing the potential for common method bias in measures of creativity and NP performance

Theoretical Framework

Conceptualization of NP and MP Creativity

The concept of creativity as a general construct has been researched widely in the fields of psychology and organizational behavior as well as in marketing (for a summary, see Table 1)

Drawing on research in the management and marketing literature (i e , Amabile 1983, 1988, Andrews and Smith 1996, Sethi, Smith, and Park 2001), as well as on exploratory field interviews in 15 firms, we define *NP* and *MP program creativity* as the degree to which NPs and their associated MPs are perceived as representing unique differences from competitors' products and programs in ways that are meaningful to target customers Consistent with Amabile (1983), we use the "output perspective" of creativity, which identifies two distinct dimensions of creativity unique differences (i e , the novelty dimension, defined as the degree to which NPs and MPs are perceived as representing unique differences from competitors) and meaningfulness to target customers (i e , the meaningfulness dimension, defined as the extent to which NPs and MPs are perceived as appropriate and useful to target customers) Amabile argues that both dimensions must be included in the concept of creativity, because the target audience may perceive ideas as weird or bizarre if they are novel or unique but carry no meaning for the audience

Augmented elements of the MP (e g , packaging, warranties, pricing, promotion, distribution) represent efforts to differentiate and facilitate the selling of core products In the launch of an NP, MPs must be creatively designed and managed to achieve rapid dissemination and maximum penetration of products (Robertson and Gatignon 1986) Our study combines the concept of NP creativity with that of MP creativity to provide a broader perspective of the role of creativity in the development and implementation of NPs Our study thus conceptualizes four separate dimensions of creativity NP novelty, NP meaningfulness, MP novelty, and MP meaningfulness

Why Is Creativity Important in Marketing Strategy?

The creation and development of creative ideas and their manifestations as NPs and MPs are considered the core elements of an innovation strategy (Zaltman, Duncan, and Holbek 1973) for at least three reasons First, creativity motivates the generation of new ideas, which is one of the key determinants of innovation (Amabile 1988, Amabile et al 1996) Innovation is conceptualized as the successful development, adoption, and implementation of creative ideas (Rogers 1983, Scott and Bruce 1994, Van de Ven 1986) Thus, creativity, which involves the generation of novel and meaningful ideas, is a necessary though not sufficient antecedent of innovation (Amabile 1988, Amabile et al 1996, Scott and Bruce 1994)

Second, creativity results in product differentiation which is an important determinant of a firm's performance (Andrews and Smith 1996, Song and Montoya-Weiss 2001, Song and Parry 1997a, 1999) Product differentiation is viewed as the degree of an NP's superiority relative to competitive products in terms of uniqueness, quality, cost effectiveness, and technical performance (Cooper 1979, Song and Parry 1997a, b) Creativity that focuses on meaningful differentiation provides a competitive advantage because product differentiation improves the performance of a firm by enhancing its customer loyalty and satisfaction (e g , Andrews and Smith 1996, Sethi, Smith, and Park 2001, Song and Montoya-Weiss 2001, Song and Parry 1997a, b, 1999)

Third, the resource-based theory of the firm suggests that creativity, which is an intangible resource embedded within the firm, can provide a competitive advantage (Barney 1991, Hunt and Morgan 1995) Creativity renders a sustainable competitive advantage to a firm because it is a strategic resource that is valuable, flexible, rare, and imperfectly imitable or substitutable

In terms of empirical research on creativity in marketing, there have been three general approaches The first approach has examined individual, group, and organizational characteristics that determine the creativity reflected in NPs (Sethi, Smith, and Park 2001) or MPs (Andrews and Smith 1996) Andrews and Smith (1996) examine determinants of MP creativity, such as individual problem-solving input, individual motivational factors, and situational factors, whereas Sethi, Smith, and Park (2001) focus on team characteristics and organizational contextual factors that influence NP creativity The second approach defines creativity in terms of the degree of novelty and examines it as an outcome of the organizational learning process (Moorman 1995, Moorman and Miner 1997) The third approach finds that creativity enhances organizational performance at the SBU level when customer ratings of these factors are used but not when manager ratings of them are used (Deshpandé, Farley, and Webster 1993) Despite the presumed importance of creativity, there is no empirical research that examines its consequences at the NPD team level

We thus have three open issues that we address in this article First, does market orientation have a positive or negative impact on NP and MP creativity? Second, does creativity affect NP performance? Third, what is the relative importance of NP creativity versus MP creativity?

Proposed Model and Research Hypotheses

We develop a model in Figure 1 that adopts Day and Wensley's (1988) source–position–performance framework, in which market orientation is the source, creativity is the positional mediator, and NP success is the performance outcome at the team level (see also Han, Kim, and Srivastava 1998, Song and Parry 1997a)

Our model incorporates both product and program dimensions simultaneously When NPs are introduced, customers evaluate creativity on the basis of not only the creative features of the products themselves but also the cre-

TABLE 1
Major Studies on Creativity

Authors	Primary Focus	Sample/Data	Measures/ Analysis Method	Definition of Creativity and Summary of Comments and Findings
Amabile (1983)	Organizational factors influencing individual creativity	120 research-and-development scientists from more than 20 corporations	Content analysis	The production of novel, useful ideas by an individual or small group of individuals working together, a model of individual creativity is integrated into a model of organizational innovation
Amabile and colleagues (1996)	Development of the climate for creativity instrument	306 (main test) and 160 (validation test) team members	Measure development methods, LISREL, and multivariate analysis of variance	Five work environment dimensions (challenge, organizational encouragement, work group supports, supervisory encouragement, and organizational impediments) influence creative behavior in an organization
Andrews and Smith (1996)	Determinants of MP creativity	193 product managers	Regression	Creativity is defined as the meaningful novelty of some output relative to conventional practice in the domain to which it belongs, MP creativity is influenced by individual problem-solving input, motivational factors, and situational factors
Besemer and O'Quin (1986)	Development of a semantic scale of creativity	133 student subjects	CFA	Output perspective of creativity can be evaluated by three dimensions novelty, resolution, and elaboration and synthesis
Besemer and Treffinger (1981)	Development of criteria to explain creativity	90 sources of creativity study	Theory	Based on literature review, different criteria (e g , novelty, resolution, and attractiveness) can be identified to measure creative output
Deshpandé, Farley, and Webster (1993)	The impact of customer orientation, culture, and creativity on firm performance	50 sets of data (i e , 50 quadrads) collected from Japanese managers	Regression	Business performance is positively influenced by the customer's evaluation of the supplier's customer orientation and organizational innovativeness Business performance is not correlated with the supplier's own assessment of customer orientation
Haberland and Dacin (1992)	Development of a measure of advertising creativity	102 students subjects	Factor analysis, correlation	Advertising creativity reflected in output is measured by Jackson and Messick's (1965) four dimensions from the viewers' judgments
Jackson and Messick (1965)	Conceptualization of creative person, process, and output	N A	Theory	Creativity is composed of four dimensions that represent (1) original and unexpected, (2) appropriate and meaningful, (3) transformational, and (4) condensed and simple

TABLE 1
Continued

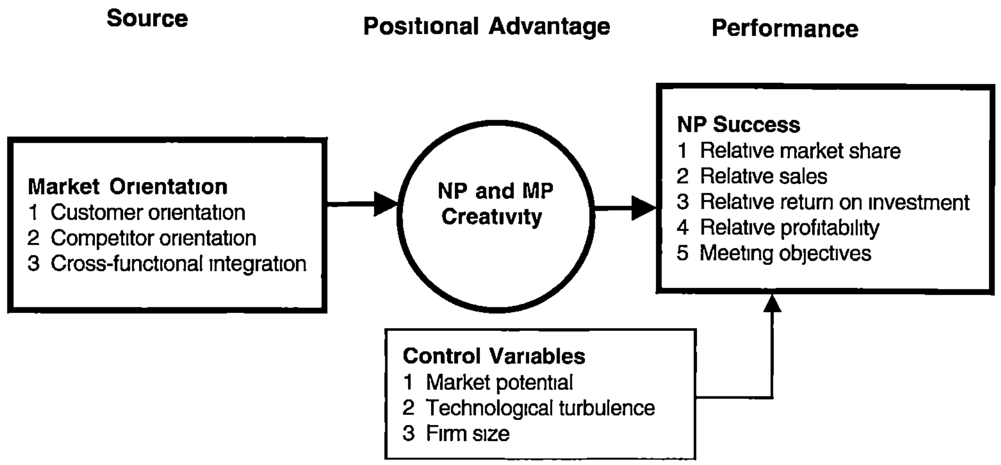
Authors	Primary Focus	Sample/Data	Measures/ Analysis Method	Definition of Creativity and Summary of Comments and Findings
Moorman and Miner (1997)	Organizational memory on NP performance and creativity	92 sets of data from mangers in advertising companies	Regression	Organizational memory levels improve short-term financial performance of NPs, whereas memory dispersion enhances both the financial performance and the creativity of NPs
Mumford and Gustafson (1988)	The understanding of creative behavior	N A	Theory	Creativity is defined as production of novel, socially valued products Creativity is best conceptualized as a syndrome involving (1) trait, (2) process, (3) environment, and (4) output
Sethi, Smith, and Park (2001)	Determinants of NP creativity in NP team context	141 managers of NP teams	Regression	Creativity is defined as the extent to which the product differs from competing alternatives in a way that is meaningful to customers New product creativity is related to team characteristics (e g , superordinate identity) and contextual influence (e g , encouragement to take risk and customers' influence)
Woodman, Sawyer, and Griffin (1993)	Conceptual links among creative persons, processes, and products	N A	Theory	Organizational creativity is defined as the creation of a valuable NP, service, idea, procedure, or process by persons working together in a complex social system Individual, group, and organizational characteristics influence creative behavior, which determines organizational creativity in a firm

Notes N A = not applicable

ative ideas reflected in the MPs associated with them Our model also simultaneously explores market orientation as an antecedent and NP performance as a consequence of creativity We draw our hypotheses from empirical research that has conceptualized creativity as the combined construct of novelty and meaningfulness (e g , Amabile 1983, Andrews and Smith 1996) As such, we do not propose different hypotheses for the separate dimensions of creativity (i e , novelty and meaningfulness) because of the lack of an empirical basis However, we do empirically explore the dimensionality of NP and MP creativity to determine whether the combined model used in prior empirical research is appropriate for our data

Our first set of hypotheses addresses the effects of market orientation on NP and MP creativity Market orientation fosters creativity because it involves the generation and dissemination of and the reaction to market intelligence and knowledge in response to market needs (Kohli and Jaworski 1990, Slater and Narver 1995) Drawing on prior research (e g , Deshpandé, Farley, and Webster 1993, Han, Kim, and Srivastava 1998, Slater and Narver 1995), we hypothesize that there is a positive impact of the three dimensions of market orientation on NP and MP creativity In the NPD context, customer orientation relates to the collection of intelligence about customers to satisfy their needs and desires as they respond to novel and meaningful stimuli (Day 1994, Deshpandé, Farley, and Webster 1993, Hunt and Morgan 1995, Kohli and Jaworski 1990, Narver and Slater 1990) A customer-oriented firm that closely monitors customers' needs tends to improve creativity by producing novel and meaningful NPs and MPs that, in turn, enhance organizational innovations through the firm's entire business system (Deshpandé, Farley, and Webster 1993, Gatignon and Xuereb 1997, Han, Kim, and Srivastava 1998) Although the debate continues on whether being close to customers fosters or impedes innovation (e g , Christensen

FIGURE 1
The Conceptual Model of NP and MP Creativity



1997, Christensen and Bower 1996, MacDonald 1995), we propose that the positive effect of customer orientation on creativity exceeds the negative effect

H_1 Customer orientation positively influences (a) NP creativity and (b) MP creativity

We hypothesize that competitor orientation positively influences creativity Competitor orientation, viewed as a firm's capability to identify, analyze, and respond to competitors' weaknesses and strengths, enhances organizational intelligence (Day and Wensley 1988, Kohli and Jaworski 1990, Narver and Slater 1990) A competitor-oriented firm tends to monitor progress against rival firms continuously, which can lead to opportunities to create products or programs that are differentiated from those of competitors It thus tends to facilitate innovations to stay ahead of competitors' innovations (Han, Kim, and Srivastava 1998) A competitor-oriented culture infused into an NP team tends to enhance NP and MP creativity because the team is keenly aware of the industry trends through the collection of intelligence from competitors, which can result in the generation of novel and meaningful NPs and MPs in response to competitors' actions Thus

H_2 Competitor orientation positively influences (a) NP creativity and (b) MP creativity

Finally, we hypothesize that cross-functional integration (XFI) positively influences NP and MP creativity The significance of XFI in generating superior values for target customers is well documented with respect to NPD (e g , Ayers, Dahlstrom, and Skinner 1997, Griffin and Hauser 1996, Gupta, Raj, and Wilemon 1986, Ruekert and Walker 1987, Song and Parry 1992, Song, Xie, and Dyer 2000, Xie, Song, and Stringfellow 1998) In NPD, XFI can be represented by the level of interaction and communication, the level of information sharing and coordination, and the degree of joint involvement in conducting specific tasks involved in an NP's development and launch (Song and Parry 1997a) We hypothesize that XFI positively affects NP and MP creativity, because it facilitates the generation, collection, and dissemination of market intelligence about novel and meaningful stimuli across functional areas, thus encouraging creativity (Jaworski and Kohli 1993) In the NPD context, XFI enhances creativity because it involves open generation and sharing of new ideas, resolution of problems and disagreements by means of nonroutine methods and different frames of reference, and responsiveness to change in novel and meaningful ways (Andrews and Smith 1996, Gatignon and Xuereb 1997, Griffin and Hauser 1996, Han, Kim, and Srivastava 1998, Van de Ven 1986) Thus, an NP team that acquires and disseminates divergent ideas and information through close XFI is more likely to generate creative ideas for developing and marketing NPs Thus

H_3 Cross-functional integration positively affects (a) NP creativity and (b) MP creativity

The Impact of NP and MP Creativity on NP Success

Studies on NP success and failure have suggested that NP creativity provides competitive product advantage by enhancing novel and useful perspectives of the product (e g , Calantone and Cooper 1981, Cooper 1979, Kleinschmidt and Cooper 1991, Song and Montoya-Weiss 2001, Song and Parry 1997a, 1999)[2] A creative firm that provides unique and meaningful products and programs will meet the changing needs of consumers by generating highly innovative and superior products and programs in the market (Cooper 1979, Deshpandé, Farley, and Webster 1993) Thus, both NP and MP creativity and proactiveness are strong strategic determinants of NP success (Griffin and Page 1996) Despite the presumed impact of NP and MP creativity on NP performance, there is a lack of empirical study on their linkage

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[2] Using the data collected from the final field study (N = 206), we further find that NP novelty and meaningfulness influence product competitive advantage in terms of relative cost, quality, and differentiation ($p < 05$), whereas MP novelty and meaningfulness fail to affect it We also find that product competitive advantage has a positive impact on market, financial, and qualitative performance outcomes ($p < 05$)

This study proposes a positive effect of both NP and MP creativity on NP success for three reasons First, NP and MP creativity play a critical role in solving problems associated with NPD and launch by providing divergent ideas in a unique and meaningful way, which guarantees the successful implementation of NPs (Cooper 1979) Second, NP and MP creativity, which entail differentiation from competitors, provide superior products and programs that improve positional advantage over competitors (Andrews and Smith 1996, Calantone and Cooper 1981, Cooper 1979, Deshpandé, Farley, and Webster 1993, Kleinschmidt and Cooper 1991) Third, NP and MP creativity that are accumulated as organizational intelligence about novel and meaningful ideas can lead to competitive advantage by meeting unique market demands in meaningful ways, which in turn results in superior NP performance (Barney 1991, Hunt and Morgan 1995) Therefore, we propose the following

H_4 Both NP and MP creativity, respectively, enhance NP success in terms of relative market share, sales, return on investment, profitability, and whether the NP meets objectives

Methodology

Sample

We performed a series of pretests, including exploratory qualitative interviews (N = 15), survey pretests (N = 21), follow-up interviews (N = 21), a research panel review (N = 6), and a pilot study (N = 106), to validate the measurement instruments and to ensure the appropriateness of the survey administration After the pretests, we collected the final data for the research using a cross-sectional survey of U S high-technology manufacturing firms

In identifying key informants within the participating firms, we adopted a two-stage sampling frame in which a project manager from each firm evaluated the performance of a selected NP, and an NP team leader (designated by the project manager) evaluated NP and MP creativity, market orientation, and control variables This sampling method, which separates informants for the measures of creativity and NP performance, is essential for this study because the causal attribution by a single informant for perceptually related constructs is considered a major source of common method bias (Ayers, Dahlstrom, and Skinner 1997, Olson, Walker, and Ruekert 1995) [3] Both project managers and NP team leaders are suitable as sources of NP and MP information because of their level of involvement in NPD activities (4 99 and 5 68 for managers' NP and MP involvement and 5 02 and 5 51 for team leaders' NP and MP involvement on a seven-point scale)

The sampling frame for the final field survey consisted of 1080 project managers drawn from the *CorpTech Directory of Technology Companies* We collected a total of 222 sets of responses, for a 20 8% response rate After we excluded 16 surveys because of incomplete responses, a total of 206 sets of responses remained [4] For the final data analysis, we combined 106 sets of responses from a pilot study with 206 responses from the final field study, resulting in a total sample of 312 We pooled the two data sets because testing a complex model by means of a structural equation model requires a substantial amount of data [5]

Another sampling issue relates to the choice of the specific NPs and MPs that the project managers selected for evaluation Managers were asked to select and report on the most recently developed NP, regardless of its level of success, for which their SBU was responsible and that had been in the market for at least 6 months Limiting the selection of NPs to those that were at least 6 months old helped informants avoid selection and social desirability biases toward more successful products (Montoya-Weiss and Calantone 1994, Olson, Walker, and Ruekert 1995, Sethi, Smith, and Park 2001) To address whether this short-term measure biases the results, a follow-up survey was mailed to the 312 managers in the final sample 12 months after the original survey We collected a total of 143 sets of usable responses in this follow-up survey, for a 45 8% usable response rate Measures of NP performance from the final field survey are significantly correlated with those from the follow-up survey at the 01 level, which confirms that short-term measures do not bias the estimation of the creativity–NP performance relationship [6] The final field study confirmed that selection bias was not serious, and the overall measure of NP success had enough variance to be estimated (mean of overall NP success on a seven-point scale = 5 16, standard deviation = 1 43)

In addition, the nonsignificant t-test results on major constructs between early and late respondents confirm that there was no significant nonresponse bias (Armstrong and Overton 1977) We also tested whether biases existed from omitted independent variables, as Calantone, Schmidt, and Song (1996) suggest We found that adding a correlation between measurement errors for any two independent variables does not significantly improve the fit of the model based on chi-square difference tests, thus confirming no bias from omitted variables Finally, multicollinearity diagnostic tests (Belsley, Kuh, and Welsch 1980, Chatterjee and Price

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[3] Although all interrater correlations for the four dimensions of NP and MP creativity between managers and NPD team leaders are significant at the 01 level, a substantial amount of variance is not commonly explained between the two respondents, thus confirming the distinctiveness of responses from the two types of respondents (highest interrater correlation = 72 for NP novelty, variance explained = 72^2 = 52, variance unexplained = 52) See Table 2, Panel A, for interrater correlations

[4] The t-tests for major constructs collected by the first respondents (i e , four dimensions of NP and MP creativity and three dimensions of NP success) indicate that there is no significant difference between complete (N = 206) and incomplete responses (N = 16) at the 05 level (all *p* values > 15)

[5] The t-tests on the major constructs show that there is no significant difference at the 05 level between the responses from the pilot study and those from the final field study In addition, we find no significant difference at the 05 level between the correlation matrix from these two samples, confirming that the two data sets can be pooled

[6] The correlations of NP performance measures between the final field survey and the follow-up survey are significant at the 01 level as follows r = 54 for MPO, r = 57 for FPO, and r = 46 for QPO

1991) confirmed that no serious multicollinearity exists for further analysis.[7]

Measures

We developed the NP and MP creativity measure by following the recommendations of Churchill (1979) and Gerbing and Anderson (1988), but we used existing measures for all other constructs. To finalize the measures that were to be included, 245 surveys were faxed to project managers in a pilot study. We collected 106 sets of responses from a project manager and an NP team leader in each company, yielding a 30.1% usable response rate. Appendix A summarizes the internal consistency of the measurement instruments for the main constructs from the pilot study.

Development of NP and MP creativity measures. Development of valid and reliable NP and MP creativity measures is a necessary first step in the validation of the concepts and structures of NP and MP creativity. Previous marketing literature has adopted either a semantic scale of creativity borrowed from the psychology literature (Andrews and Smith 1996; Sethi, Smith, and Park 2001) or an NP creativity measure that focuses on assessing the degree of the changes by NP ideas (Moorman 1995; Moorman and Miner 1997). We tailored our domain-specific measure of NP and MP creativity to assess creativity in both NPD and launch contexts.

We drew the initial 39 measurement items from an extensive literature review and from exploratory interviews with 15 project managers in high-technology firms. A total of 10 measurement items that exhibited desirable psychometric properties for assessing the creativity of both NPs and MPs remained after we conducted a series of pretests using the traditional measure-development methods that include coefficient alpha, item-to-total correlations, and exploratory factor analysis (for measure items, see Appendix A).

We used the pilot study (N = 106) as a basis for additional scale refinement of the NP and MP creativity measures. Using the sample of team leaders, we purified the remaining measure items in an iterative manner (Churchill 1979). We dropped two items in the measure ("is stimulating" and "reflects a customary perspective in this industry") because of the double-loading problem in the exploratory factor analysis, which deteriorates the internal validity. In addition, we performed a confirmatory factor analysis (CFA) on the remaining eight items using the sample of managers as the validation sample. All the factor loadings were significant and had high R^2 values, thus confirming convergent validity (Bagozzi and Yi 1988; Bagozzi, Yi, and Phillips 1991).

In the final field study (N = 206), we validated the NP and MP creativity measures using the team leaders' responses as the trigger sample and the managers' responses as the validation sample. In the final validation process (using correlations of related measures, interrater correlations, and test–retest reliabilities), we found that our measures have good discriminant validity and convergent validity as well as reliabilities (for correlations of related measures, see Table 2, Panel A).[8] We further collected data (N = 29) from customers, who are the ultimate judges of creativity. The significant correlations between managers' and customers' ratings on creativity ($r = .49$, $p < .01$ for NP creativity; $r = .53$, $p < .01$ for MP creativity) provide evidence that managers' responses can represent customers' perspectives.

Measures of other constructs. We tested the measure instruments for the other major constructs (i.e., market orientation and NP performance as well as the control variables) for their validity and reliability in two waves. First, in a pilot study, we revised and refined measurement items using traditional measure-development methods as recommended by Churchill (1979). After measure refinement, the results for Cronbach's alphas that are greater than .70 (Nunnally 1978) show that all measures of the major constructs exhibit good internal consistency (for measurement items and coefficient alphas, see Appendix A). Second, in the final field study, the results from the confirmatory measurement model suggest that all indicators are significantly loaded on the subjective latent constructs, thus confirming good convergent validity (Bagozzi and Yi 1988; Bagozzi, Yi, and Phillips 1991). In addition, the significant results from chi-square difference tests in favor of unrestricted models (i.e., correlations are freely estimated) over restricted models (i.e., correlations are fixed at 1) for all pairs of constructs in Table 2 confirmed discriminant validity for all constructs (Anderson and Gerbing 1988). Overall, all measures have good construct validities and desirable psychometric properties.

Market orientation. We adopted Narver and Slater's (1990) measure of market orientation to assess customer orientation, competitor orientation, and XFI. After we excluded 2 items that had low item-to-total correlations, the remaining 13 measurement items represented the three dimensions of market orientation well and had good reliabilities (see Cronbach's alpha, Appendix A).

NP success. As NP strategy researchers (e.g., Montoya-Weiss and Calantone 1994; Song and Parry 1997a, b) recommend, we used multiple measures of NP success to

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[7] To address possible problems of multicollinearity from high correlations among independent variables, we regressed each of the four dimensions of NP and MP creativity on three factors of market orientation. All condition indexes (Belsley, Kuh, and Welsch 1980) were less than 30, and all variance inflation factors were much less than 10 (Chatterjee and Price 1991). Thus, multicollinearity is not a concern for further analysis.

[8] We examined correlations among three different measures: (1) a single-item global measure of creativity, (2) a ten-item semantic scale measure of creativity (adopted from Besemer and O'Quin 1986), and (3) an eight-item new measure of NP and MP creativity (for correlations and means, see Table 2, Panel A). Each of the four dimensions in the new measure of NP and MP creativity significantly correlates with the single-item and the ten-item measures at the .05 level, thus proving convergent validity. In addition, interrater correlations between a team leader in the trigger sample and a manager in the validation sample are all significant ($p < .01$), indicating good convergent validity (e.g., John and Reve 1982). The correlation analysis using the data collected from the follow-up survey, conducted 12 months after the final field survey, shows good test–retest reliabilities for all four dimensions ($p < .01$).

TABLE 2
Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean (s.d.)
A. Correlations Among Creativity Measures (N = 312)															
1 NP-novel$_{TL}$	1														18 69 (5 82)
2 NP-meaning$_{TL}$	27**	1													23 56 (3 86)
3 MP-novel$_{TL}$	48**	24**	1												15 27 (5 46)
4 MP-meaning$_{TL}$	18**	46**	70**	1											19 19 (4 41)
5 NP-novel$_{MGR}$	72**	15**	32**	12*	1										18 70 (5 81)
6 NP-meaning$_{MGR}$	17**	59**	15**	32**	26**	1									24 01 (3 73)
7 MP-novel$_{MGR}$	30**	14**	57**	44**	39**	14*	1								14 95 (5 61)
8 MP-meaning$_{MGR}$	06	34**	37**	62**	12*	41**	65**	1							18 91 (4 39)
9 NP-creat$_{GLO}$	54**	39**	38**	34**	42**	28**	30**	24**	1						5 25 (1 25)
10 MP-creat$_{GLO}$	07	24**	50**	55**	08	20**	38**	37**	45**	1					4 38 (1 46)
11 NP-novel$_{SEM}$	77**	27**	38**	19**	64**	18**	29**	03	63**	13	1				31 73 (6 07)
12 NP-meaning$_{SEM}$	13	52**	18*	32**	13	37**	12	22**	31**	19**	31**	1			24 03 (3 93)
13 MP-novel$_{SEM}$	12	25**	67**	60**	07	09	43**	37**	30**	73**	19**	24**	1		25 19 (7 56)
14 MP-meaning$_{SEM}$	– 01	40**	31**	57**	– 01	29**	29**	41**	26**	45**	14*	52**	55**	1	21 43 (4 18)

TABLE 2
Continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean (s.d.)
B. Correlations Among Major Constructs (N = 312)															
1 NP-novel	1														18 69 (5 82)
2 NP-meaning	27**	1													23 56 (3 86)
3 MP-novel	48**	24**	1												15 27 (5 46)
4 MP-meaning	18**	46**	70**	1											19 20 (4 41)
5 Customer orientation	05	28**	32**	38**	1										23 61 (5 58)
6 Competitor orientation	14**	23**	25**	31**	56**	1									19 61 (4 42)
7 XFI	11	30**	26**	32**	51**	51**	1								18 46 (4 92)
8 MPO	14*	38**	18**	32**	11	13*	05	1							28 40 (8 82)
9 FPO	11	37**	15*	26**	15**	22**	12*	73**	1						27 83 (8 76)
10 QPO	32**	46**	26**	34**	18**	16**	17**	65**	60**	1					15 54 (3 70)
11 Market potential	10	24**	20**	24**	18**	15*	14*	08	17**	23**	1				13 53 (4 42)
12 Technological turbulence	– 01	17**	– 01	08	09	11	10	– 03	– 04	04	29**	1			19 30 (5 84)
13 Firm size	06	– 09	– 07	– 11	– 09	– 13*	– 11*	– 04	– 05	02	01	01	1		5218 58 (25641)

*$p <$ 05 (two-tailed)
**$p <$ 01 (two-tailed)
Notes TL = team leader survey, MGR = manager survey, GLO = global measure, and SEM = semantic scale

assess different perspectives of NP performance, including market measures (e g , relative market share, relative sales), financial measures (e g , relative return on investment, relative profitability), and overall assessment measures (e g , meeting objectives for customer satisfaction and technological advancement) For the NP success measure, we adopted relative sales, return on investment, market share, and profitability from the work of Song and Parry (1997a), and we added a global measure adapted from the works of Kleinschmidt and Cooper (1991) and Page (1993) Consistent with Song and Parry (1997b), we used relative subjective measures (e g , performance relative to a firm's other products and original objectives), because objective measures (e g , financial data) are often inaccurate or unavailable for NPs (e g , Han, Kim, and Srivastava 1998, Song and Parry 1997a, b)

In the pilot study, the exploratory factor analysis of the measurement items of NP success suggests that the original measurement model with five consequence constructs (Figure 1) can converge into a more parsimonious model with three consequence constructs Consistent with the work of Lumpkin and Dess (1995), measurement items from relative sales and relative market share converge into one underlying dimension, designated as market performance outcome (MPO) Measurement items from relative return on investment and relative profitability also converge into another dimension, designated as financial performance outcome (FPO) The three items for a global measure constitute the final factor, which we renamed qualitative performance outcome (QPO) The three renamed constructs have good internal consistency, as reflected by their Cronbach's alphas (91 for MPO, 91 for FPO, and 77 for QPO)

Control variables We included three control variables that are commonly believed to influence the outcome of NP activities in the high-technology industry market potential, technological turbulence, and firm size [9] After we removed one item that had low item-to-total correlation from a pilot study, the measurement items for market potential and technological turbulence exhibited good reliabilities (see Appendix A) We used market potential, which is defined as the potential demand for the NP in the target market (Han, Kim, and Srivastava 1998, Narver and Slater 1990, Song and Parry 1997a), to control for the environmental impact on NP performance Technological turbulence, defined as a rapid rate of technological change, is considered an important environmental factor that influences NP performance (Jaworski and Kohli 1993, Narver and Slater 1990, Song and Montoya-Weiss 2001) Finally, we included firm size, defined as the number of employees in a firm (Chandy and Tellis 2000, Narver and Slater 1990), to control for the impact of a firm's resources on NP success

Model Estimation and Results

Before we tested the hypotheses, we examined a correlation matrix for the composite scales of the major constructs (see Table 2) The signs of the bivariate correlations appear to be consistent with the hypothesized relationships There is also variability in the measures of the major constructs, as reflected by the means and standard deviations shown in Table 2 (Panel B)

Testing the Model of Creativity

We estimated path coefficients using maximum likelihood (ML) estimation in the structural equation modeling method (Bollen 1989) [10] In testing the main effects from market orientation to NP and MP creativity and to NP success, we followed Anderson and Gerbing's (1988) two-step approach in structural equation modeling, for which the estimation of a confirmatory measurement model must precede the simultaneous estimation of the measurement and structural submodels The ML estimation results from a confirmatory measurement model show goodness-of-fit indexes that are greater than 95, significant loadings, and high squared multiple correlation (SMC) values (equivalent to R^2, lowest SMC = 28), thus confirming convergent validity (Bagozzi and Yi 1988) Because interpretational confounding from the measures was no longer an issue, we performed simultaneous estimation of the measurement and structural models to test the hypotheses Following the general approach to combine novelty and meaningfulness into creativity (e g , Amabile 1983, Andrews and Smith 1996, Sethi, Smith, and Park 2001), we tested a model that links three dimensions of market orientation to NP and MP creativity with three dimensions of NP success, as illustrated in Figure 2 (Panel A), with standardized coefficients and other fit statistics To assess the differential effects, we report standardized coefficients as path coefficients

First, we examine the overall model fit The chi-square statistic ($\chi^2 = 3442$ 42, degrees of freedom [d f] = 884) is significant because of the sensitivity of the sample size However, all the baseline comparison indexes (normed fit index [NFI, $\Delta 1$], incremental fit index [IFI, $\Delta 2$], relative fit index [RFI, $\rho 1$], and Tucker–Lewis index [TLI, $\rho 2$]) greater than 92 and the root mean square error of approximation (RMSEA) value of 10 indicate an acceptable fit of the data, according to Browne and Cudeck's (1993) cutoff criteria

Second, H_1–H_3 examine the impact of three dimensions of market orientation on both NP and MP creativity The estimation results show that three paths are significant at the 05 level (γ = 22, standard error [s e] = 08 between customer orientation and MP creativity, γ = 26, s e = 05 between XFI and NP creativity, and γ = 19, s e = 08 between XFI and MP creativity) However, the other three paths (customer orientation and NP creativity, competitor

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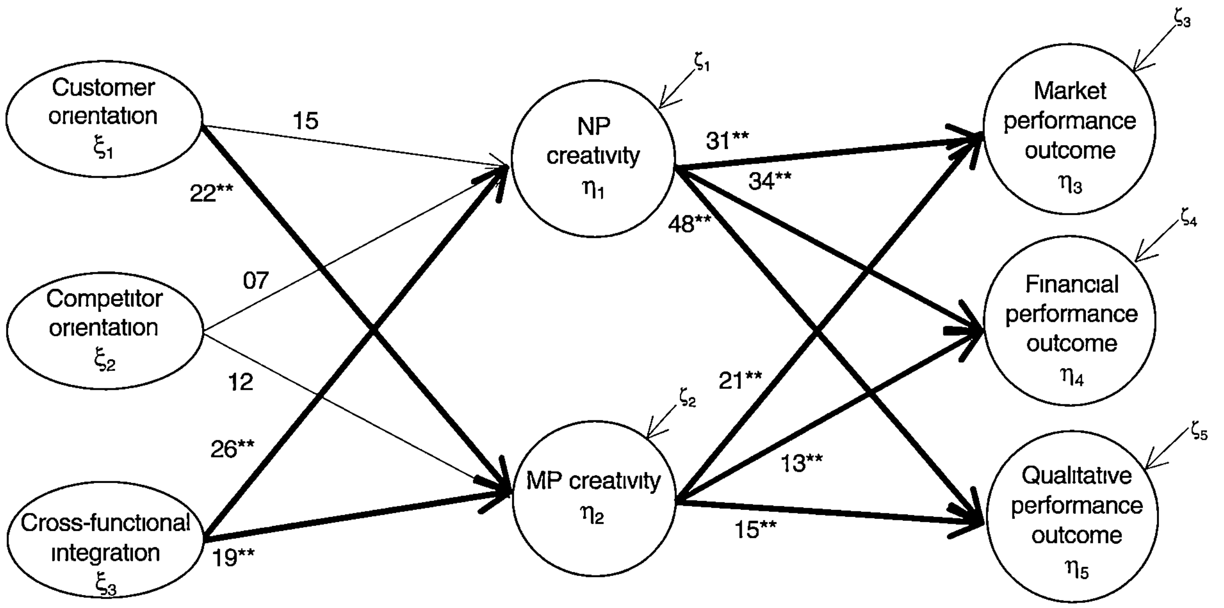
[9] We selected these three variables from the work of Narver and Slater (1990) because these characteristics strongly influence how creativity influences NP performance in NPD processes We also tested whether these control variables moderate the creativity–NP performance relationships In general, we found no moderating effects

[10] Because we find a significant multivariate kurtosis that violates the multivariate normality assumption in the ML estimation, we use 1000 bootstrap samples, for which the means serve as a proxy for the sampling distribution of the population The results show that the bootstrapping estimation is statistically equivalent to that using ML estimation, thus confirming that the ML estimation is robust, despite the presence of multivariate kurtosis

FIGURE 2
Structural Equation Model of NP and MP Creativity

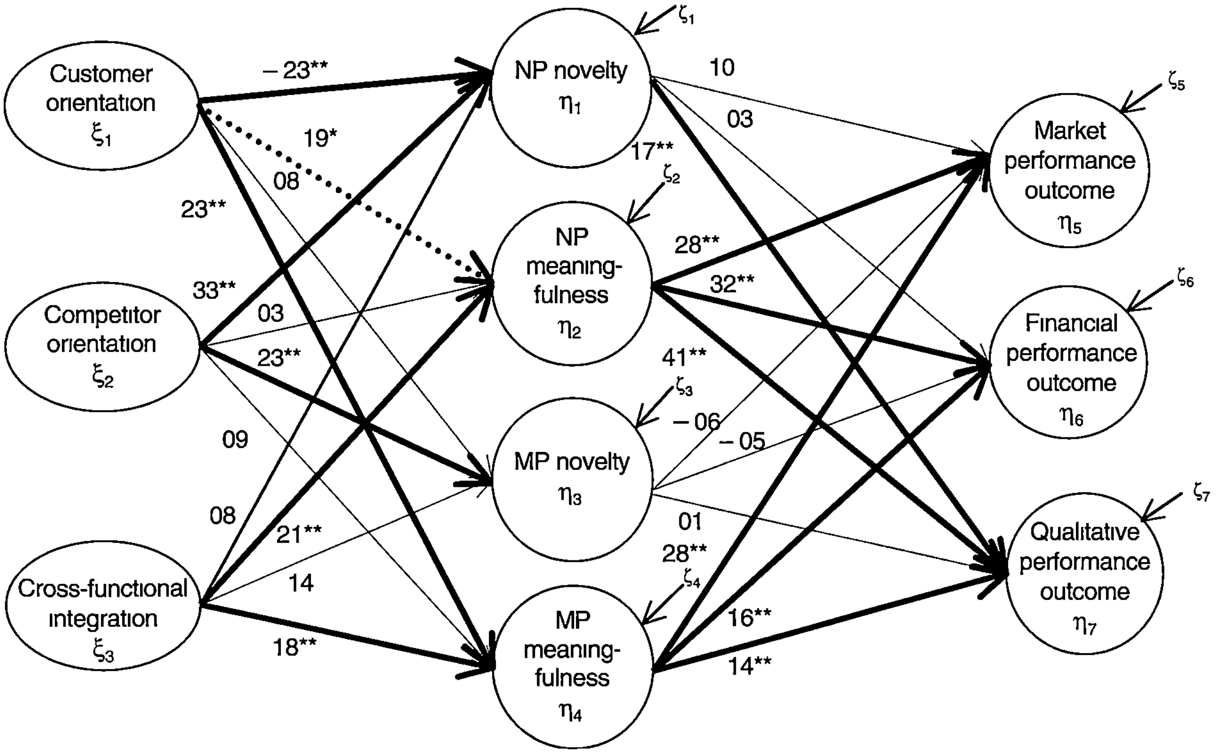
A. Combined Model Standardized Coefficients (N = 312)



Customer orientation ξ_1
Competitor orientation ξ_2
Cross-functional integration ξ_3
NP creativity η_1
MP creativity η_2
Market performance outcome η_3
Financial performance outcome η_4
Qualitative performance outcome η_5
ζ_1
ζ_2
ζ_3
ζ_4
ζ_5
15
22**
07
12
26**
19**
31**
34**
48**
21**
13**
15**

**p < 05
Notes Fit statistics χ^2 (d f) = 3442 42 (884), p < 05, NFI = 92, RFI = 92, IFI = 94, TLI = 94, and RMSEA = 10

B. Component-wise Model Standardized Coefficients (N = 312)



Customer orientation ξ_1
Competitor orientation ξ_2
Cross-functional integration ξ_3
NP novelty η_1
NP meaningfulness η_2
MP novelty η_3
MP meaningfulness η_4
Market performance outcome η_5
Financial performance outcome η_6
Qualitative performance outcome η_7
ζ_1
ζ_2
ζ_3
ζ_4
ζ_5
ζ_6
ζ_7
– 23**
19*
08
23**
33**
03
23**
09
08
21**
14
18**
10
03
17**
28**
32**
41**
– 06
– 05
01
28**
16**
14**

*p < 10
**p < 05
Notes Fit statistics χ^2 (d f) = 2044 09 (862), p < 05, NFI = 96, RFI = 95, IFI = 97, TLI = 97, and RMSEA = 07

orientation and NP creativity, and competitor orientation and MP creativity) failed to reach the desired significance level. Overall, H_{1b}, H_{3a}, and H_{3b} are supported, whereas H_{1a}, H_{2a}, and H_{2b} are rejected.

Third, H_4 posits a positive influence of NP and MP creativity on three dimensions of NP success. Our estimation results show that all paths from NP creativity to the three outcome dimensions are significant at the .05 level ($\beta = .31$ [s.e. = .21], .34 [s.e. = .24], and .48 [s.e. = .25] for the links between NP creativity and MPO, FPO, and QPO, respectively). Similarly, all paths from MP creativity to the three dimensions of NP success ($\beta = .21$ [s.e. = .09], .13 [s.e. = .09], and .15 [s.e. = .08] for the links between MP creativity and MPO, FPO, and QPO, respectively) are significant at the .05 level. Therefore, H_4 is supported.

Fourth, we reassessed the model with the three control variables: market potential, technological turbulence, and firm size.[11] Overall, we find that, in general, the control variables do not influence the three dimensions of NP success at the .05 level (for details, see Appendix B). However, the results indicate that FPO is influenced positively by market potential ($\beta = .10$, s.e. = .06) and negatively by technological turbulence ($\beta = -.10$, s.e. = .06) at the .05 level.

Model Respecification

Although our ML estimation results indicate strong support for our hypotheses (9 of 12 hypotheses are supported at the .05 level), the lack of good fit reflected by the chi-square test and RMSEA led us to respecify the model further. As part of the measure-development process, we explored the dimensionality of the creativity measure using CFA to provide additional evidence of reliability and validity (Anderson and Gerbing 1988, Gerbing and Anderson 1988). To verify whether novelty and meaningfulness converge into the higher-order construct of creativity, we follow the method that Bollen and Grandjean (1981) recommend. They suggest that the chi-square difference between a measurement model with perfect correlation (for the unidimensional model) and another with freely estimated correlation (for the two-dimensional model) be examined to confirm the convergence of the two dimensions. The measurement models with two separate dimensions fit the data significantly better than do those with one dimension for both NP creativity and MP creativity ($\Delta\chi^2 = 478.39$ [d.f. = 1] for the two dimensions of NP creativity, $\Delta\chi^2 = 366.60$ [d.f. = 1] for the two dimensions of MP creativity). In addition, the ML estimation results ($\chi^2 = 38.85$, d.f. = 19, $p < .05$, NFI = .99, IFI = .99, TLI = .99, CFI = .99, RMSEA = .07) show that all of the coefficient parameters (λs) in the two-dimensional model are statistically significant with high SMCs (i.e., SMC equivalent to R^2, lowest SMC = .54), thus ensuring the convergent validity of the measure (Bagozzi and Yi 1988, Bagozzi, Yi, and Phillips 1991). Thus, in contrast to previous creativity research that employs the average score of the combined dimensions of novelty and meaningfulness (Andrews and Smith 1996, Sethi, Smith, and Park 2001), our empirical results indicate that the two dimensions should be assessed distinctively.

We further examined whether the four dimensions of NP and MP creativity converge into one overarching dimension of creativity in order to explore the possibility of a more parsimonious model with a hierarchical structure. Chi-square difference tests confirm that the first-order condition model fits the data significantly better than does the second-order condition model ($\Delta\chi^2 = T_{\text{second order}} - T_{\text{first order}} = 83.41$ with 2 d.f.), thus ensuring the discriminant validity of the NP and MP creativity measures (Bagozzi and Edwards 1998). Thus, we find that the measure of NP and MP creativity has better construct validity (Peter 1981) when the novelty and meaningfulness dimensions are separately estimated than when they are combined.

As a result of this testing of the dimensionality of creativity, we conclude that our combined model in Figure 2, Panel A, should be respecified with the four dimensions of NP and MP creativity. This is consistent with Han, Kim, and Srivastava's (1998) component-wise approach. Our CFA also confirms the use of separate dimensions of market orientation, creativity, and NP success. Because prior empirical research on creativity has never separated the effects of novelty and meaningfulness, we do not have an empirical basis for reformulating our hypotheses. In addition, theoretical work on creativity has not proposed differential effects for dimensions of creativity. We thus decided to examine the respecified component-wise model in an exploratory fashion, leaving our hypotheses unchanged.

Figure 2, Panel B, displays the respecified hypothesized links with significant paths and standardized coefficients in the component-wise model. First, all the baseline comparison indexes (NFI [$\Delta 1$], IFI [$\Delta 2$], RFI [$\rho 1$], and TLI [$\rho 2$]) that are greater than .95 indicate that the respecified model improved its fit to the data from the original model.[12] The chi-square difference test ($\Delta\chi^2 = 1398.33$, Δd.f. = 22) shows that the respecified model ($\chi^2 = 2044.09$, d.f. = 862) in Figure 2, Panel B, fits the data significantly better than does the original model ($\chi^2 = 3444.42$, d.f. = 884) in Figure 2, Panel A. The RMSEA value of .07 also indicates that the model fits the data reasonably well, according to Browne and Cudeck's (1993) cutoff criteria. In addition, reasonably high SMC values (.07 for NP novelty, .15 for NP meaningfulness, .16 for MP novelty, .19 for MP meaningfulness, .18 for MPO, .15 for FPO, and .30 for QPO) indicate that a reasonable amount of variance in the endogenous variables is accounted for by relevant constructs in the model.

H_1 proposes that customer orientation enhances the four dimensions of NP and MP creativity. In contrast to our expectation, the estimation results indicate that customer orientation influences NP novelty significantly but negatively at the .05 level ($\gamma = -.23$, s.e. = .13). Customer orientation has a positive relationship with NP meaningfulness at the .10 level ($\gamma = .19$, s.e. = .09). The path from customer orientation to MP novelty is not significant (γ = 08, s e = 12), whereas customer orientation has a positive impact on MP meaningfulness (γ = 23, s e = 11)

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[11] Fit statistics for this model are as follows: $\chi^2 = 3541.88$ (d.f. = 1239, $p < .05$), NFI = .93, IFI = .95, RFI = .92, TLI = .95, and RMSEA = .08.

[12] We compared the fit of this final model with correlated measurement and latent errors ($\chi^2 = 2044.09$, d.f. = 862) with that of a baseline model without correlated errors ($\chi^2 = 2925.78$, d.f. = 878). The chi-square difference test shows that this model fits the data significantly better than does the baseline model ($\Delta\chi^2 = 88.69$, Δd.f. = 16).

H_2 predicts that competitor orientation positively influences NP and MP creativity The results show that competitor orientation enhances both NP novelty (γ = 33, s e = 14) and MP novelty (γ = 23, s e = 13) at the 05 level In contrast, competitor orientation has no impact on either NP meaningfulness (γ = 03, s e = 10) or MP meaningfulness (γ = 09, s e = 12)

H_3 posits that XFI has a positive impact on NP and MP creativity The paths from XFI to NP novelty and MP novelty are not significant (γ = 08, s e = 12 for NP novelty, γ = 14, s e = 12 for MP novelty) However, XFI has a significant, positive impact on both NP meaningfulness (γ = 21, s e = 09) and MP meaningfulness (γ = 18, s e = 11) at the 05 level

H_4 posits that both NP and MP creativity positively influence the three dimensions of NP success The results regarding NP creativity reveal that NP novelty does not affect MPO (β = 10, s e = 06) or FPO (β = 03, s e = 07), though it does have a positive impact on QPO (β = 17, s e = 06) at the 05 level The estimation results also confirm that NP meaningfulness has a positive impact on MPO (β = 28, s e = 08), FPO (β = 32, s e = 09), and QPO (β = 41, s e = 08) Furthermore, the results regarding MP creativity indicate that no dimension of NP success is influenced by MP novelty (β = – 06, s e = 07 for MPO, β = – 05, s e = 08 for FPO, β = 01, s e = 07 for QPO) The estimation results further confirm that MP meaningfulness has a positive impact on all three dimensions of NP success at the 05 level (β = 28, s e = 08 for MPO, β = 16, s e = 09 for FPO, β = 14, s e = 07 for QPO)

We reassessed the model after we added market potential, technological turbulence, and firm size as control variables (for details, see Appendix C) Fit statistics for this model are as follows χ^2 = 2654 32 (d f = 1226, $p <$ 05), NFI = 95, IFI = 97, RFI = 94, TLI = 97, and RMSEA = 06 When the three control variables are added, all the main effects remain the same, except for the path from MP meaningfulness to QPO This path, which was significant at the 05 level in the initial model, becomes significant at the 10 level (β = 13, s e = 07, t = 1 86) We find that market potential does not influence either MPO (β = – 03, s e = 05) or FPO (β = 10, s e = 06), though it significantly influences QPO (β = 13, s e = 05) The significant result for QPO indicates that potential demand for the NP in the target market helps a firm achieve its objective with regard to customer satisfaction and technological advancement In addition, our results indicate that technological turbulence has no impact on MPO (β = – 09, s e = 05) or QPO (β = – 06, s e = 05), but it marginally influences FPO at the 10 level (β = – 11, s e = 06) Finally, we find that firm size does not influence any of the three dimensions of NP success (β = 01, s e = 01 for MPO, β = – 02, s e = 01 for FPO, β = 05, s e = 01 for QPO)

Direct Effects of Market Orientation

To examine the mediating effects of the four dimensions of NP and MP creativity, we examine whether the direct effect from market orientation to NP success is greater than the mediating effect through NP and MP creativity The direct impact of market orientation on NP performance is well documented (e g , Ayers, Dahlstrom, and Skinner 1997, Song and Parry 1997a, Song, Xie, and Dyer 2000, Xie, Song, and Stringfellow 1998) To test the direct path from market orientation to NP success, we added a direct path from each dimension of market orientation to each dimension of NP success one at a time and compared the chi-square difference (with one d f) from the model proposed in Figure 2, Panel B (Bagozzi and Yi 1988) Chi-square difference tests show that, in general, the addition of a direct path does not improve the fit significantly at the 05 level (except for two cases, between competitor orientation and FPO and between XFI and MPO) In addition, we compared the magnitude of direct and indirect effects calculated from coefficients when each direct path is added to the restricted model The results show that the indirect effects thorough NP and MP creativity are more dominant than the direct effect in explaining the total effect between market orientation and NP success (except for the two paths mentioned previously)

Discussion

Our respecified component-wise model in Figure 2, Panel B, shows interesting patterns of significant relationships among the dimensions of market orientation, NP and MP creativity, and NP performance We find that customer orientation has a positive impact on both NP and MP meaningfulness, though the path from customer orientation to NP meaningfulness is not strong This means that, in general, the enhancement of customer orientation results in more meaningful marketing programs (e g , discounts) and new products (e g , faster processing chips) A notable finding is the negative impact of customer orientation on NP novelty It appears that enhancing customer orientation is less likely to help a firm create novel products, because current customers may not approve novel product ideas because of their inertia toward existing products in the market However, the insignificant effect of customer orientation on MP novelty implies that a firm's effort to monitor customers' needs and expectations does not lead to the generation of novel MPs

In relating competitor orientation to creativity, we find that enhancing competitor orientation results in improving novel dimensions of NPs and MPs but not meaningful dimensions of them This indicates that a firm that carefully monitors competitors' activities tends to produce novel but not meaningful products and programs We also find that XFI significantly influences meaningful dimensions of NPs and MPs but not novel dimensions of them A firm that emphasizes the importance of interactions across different departments encourages NP team members to remove the sources of meaningless NPs and MPs and thus accumulate intelligence to enhance their value and usefulness This result is consistent with previous findings that XFI results in providing creativity through problem solving in meaningful and efficient ways (e g , Song and Parry 1997a, Van de Ven 1986, Zaltman, Duncan, and Holbek 1973)

In contrast, the insignificant effect of XFI on NP and MP novelty is an indication that NP teams' efforts to produce novel and radical NPs and MPs have been suppressed by opinions from other functional groups New product teams with high XFI are less motivated to take risks in generating novel and unique ideas, which other functional groups often consider "weird" Our interpretation is that they tend to indulge in groupthink or to exhibit a social loafing effect, which yields a poor search for alternatives and information on novel stimuli (Hogg 1992, Sethi, Smith, and Park 2001, Woodman, Sawyer, and Griffin 1993) In addition, our analysis of the relationship between market orientation and NP success shows that the indirect effect through creativity is more dominant than the direct effect, thus supporting our specification of creativity as a mediator

We further examine empirical evidence on whether creativity enhances NP success at the NP team level We also find differential effects between the dimensions of NP and MP creativity and NP performance In linking novelty and NP performance, five of the six paths from NP and MP novelty to NP success are not significant In general, these findings imply that an increase in novel features of NPs or MPs does not influence NP success in terms of market, financial, or qualitative performance Finally, one of the more important results of this study is the finding that both NP and MP meaningfulness positively influence MPO, FPO, and QPO These empirical findings suggest that the patterns of differential effects for NP success in terms of market, financial, and qualitative performance are driven by the increases in valuable and meaningful attributes of NPs and MPs, not by novel ones

Theoretical Implications

First, our research demonstrates that novelty and meaningfulness should be examined separately rather than combined into a single creativity construct, as has been done in prior empirical research Our component-wise model that separates novelty and meaningfulness (in Figure 2, Panel B) provides a clear theoretical explanation of the mediating role of the different dimensions of creativity with a significantly better fit to the data Consistent with Amabile (1983, 1988), we find that meaningfulness and novelty are distinct, separate dimensions of creativity We reached this finding through a rigorous measure-development and validation process As a result, our research contributes to the conceptualization and measurement of creativity in the NPD and launch contexts by developing and validating NP and MP creativity measures

Second, this study suggests that creativity of MPs should be considered in addition to the creativity of NPs themselves By supporting the importance of MP creativity, our study implies the need to examine the influence of "augmented elements" of products on NP strategy (Levitt 1980) Creative MPs play a critical role in commercializing products in the implementation stage through meaningfully novel promotion, pricing, distribution, and services (Cooper 1979), whereas NP creativity plays a critical role in generating new ideas in the initiation stage of NPD

Third, the methodological approaches used to test the model of creativity provide guidelines for further NPD research We used the two-stage sampling frame with dual informants to avoid the common method bias and the causal attributions caused by measuring the two related constructs, such as creativity and NP success, by one respondent (e g , Olson, Walker, and Ruekert 1995)

Managerial Implications

First, managers should evaluate the trade-offs between the positive and negative effects of market orientation on creativity instead of assuming that market orientation is a panacea for enhancing creativity The inconsistent claims about the market orientation and innovation link from previous studies may be because novelty and meaningfulness as key determinants of innovation had not been examined separately in their relationships with dimensions of market orientation When a firm works to listen and respond to the customer's voice and to interact closely in order to share information across functional groups, it tends to provide meaningful products and programs (though not novel ones) In contrast, a firm that works to monitor competitors' activities tends to provide novel products and programs because it focuses on more salient and novel features

Second, NP success tends to be driven more by the meaningfulness dimensions of NPs and MPs than by their novelty dimensions By examining the differential effects of NPs and MPs, we empirically find that meaningfulness is more important than novelty in helping a firm achieve its desired financial and market goals From our respecified component-wise model, it is important to note that the significant relationship between creativity and NP success is driven by the strong effects from meaningfulness dimensions, not from novelty dimensions of NP and MP

Third, consistent with Christensen's (1997) claim, we find that customer orientation can be detrimental to the generation of novel perspectives for NPs in high-technology firms However, by and large, this does not matter, because novelty has little effect on NP outcomes From a perceptual map perspective, a close focus on competitors may lead a firm to find a novel position in the market (a "hole" in the perceptual map), but such a novel position does not directly affect performance given that the hole may exist because products in this position do not provide meaningful benefits to customers, and thus there is no demand there

Fourth, the creativity of NPs is more likely to influence NP success than is the creativity of MPs When we compare standardized coefficients in Figure 2, Panel B, in general, NP novelty and meaningfulness provide a stronger impact on the three factors of NP success than do MP novelty and meaningfulness To test the differential effects between NP creativity and MP creativity in explaining NP success, we further tested the two models (1) one that includes the paths only from NP novelty and NP meaningfulness and (2) one that includes the paths only from MP novelty and MP meaningfulness The SMC (R^2) values for in the first model (MPO = 17, FPO = 16, and QPO = 31) are all greater than those in the second model (MPO = 13, FPO = 09, and QPO = 14), thus supporting the claim that NP creativity explains variances of NP success better than MP creativity does This implies that consumers tend to recognize novel and meaningful ideas for NPs more saliently than they do those for MPs

Fifth, MP creativity is important for NP strategy in high-technology firms, as indicated by the significant impact on NP performance, though it is less influential than NP creativity Despite the tendency to invest more money in NPs, the importance of a firm's committing resources to creative MPs cannot be overstated When NPs are introduced, customers evaluate creativity on the basis of not only the creative features of the products themselves but also the creative ideas used in the MPs associated with them For example, the perceived creativity of the Apple iMac computer may stem as much from the way the product was marketed and launched

In summary, our findings imply that customer orientation and XFI are the driving forces of NP success through the meaningfulness dimensions of NP and MP creativity, whereas competitor orientation fails to influence NP performance, despite its significant influence on novelty We further find that the indirect effect through meaningfulness is more dominant than the direct effect from market orientation to NP success, thus providing evidence that the meaningfulness dimensions of creativity mediate the market orientation–NP performance relationship

Limitations and Future Research Directions

As with any study, our results must be evaluated in light of certain key limitations The first limitation is related to the choice of sample frame The selection of firms in high-technology industries for the sampling frame excludes other segments that are involved in providing creative ideas in the NPD and launch processes Thus, the study of creativity should be extended to other industries, such as consumer goods or services, to help generalize the findings

Second, although this study provides evidence of how creativity as the necessary determinant of innovation influences performance, it does not examine the direct impact of innovation on performance or the impact of imitation on performance Follow-up research should consider directly examining innovation and imitation as well as other intangible assets, such as entrepreneurship and "intrapreneurship"

Third, additional variables might be added to the model, such as group or organizational antecedents (e g , group cohesion, formalization, risk taking, motivation), and other mediators might be included (e g , product differentiation, competitive advantage, product radicalness) Future decisions about the inclusion of more variables must take into consideration the trade-offs between the need for a parsimonious model and the desire for a comprehensive one

APPENDIX A
NP and MP Creativity Measure Items and Samples of Other Scale Items

A NP and MP Creativity· New

NP and MP Novelty (seven-point, four-item scale, Cronbach's α = 89 for NP novelty and 90 for MP novelty)

Compared to your competitors, the new product you selected [or its associated marketing program][a]

- Is really "out of the ordinary"
- Can be considered as revolutionary
- Is stimulating [b]
- Reflects a customary perspective in this industry (reverse coded)[b]
- Provides radical differences from industry norms
- Shows an unconventional way of solving problems

NP and MP Meaningfulness (seven-point, four-item scale, Cronbach's α = 91 for NP meaningfulness and 90 for MP meaningfulness)

Compared to your competitors, the new product you selected [or its associated marketing program]

- Is relevant to customers' needs and expectations
- Is considered suitable for customers' desires
- Is appropriate for customers' needs and expectations
- Is useful for customers

B. Market Orientation (Narver and Slater 1990)

Customer Orientation (seven-point, five-item scale, Cronbach's α = 85)

Our business objectives are driven primarily by customer satisfaction

We constantly monitor our level of commitment and orientation to serving customers' needs

Our strategy for competitive advantage is based on our understanding of customers' needs

Our business strategies are driven by our beliefs about how we can create greater value for customers

We measure customer satisfaction systematically and frequently

We give close attention to after-sales service [b]

Competitor Orientation (seven-point, four-item scale, Cronbach's α = 72)

Our salespeople regularly share information within our business concerning competitors' strategies

We rapidly respond to competitive actions that threaten us

Top management regularly discusses competitors' strengths and strategies

We target customers where we have an opportunity for competitive advantage

Cross-Functional Integration (seven-point, four-item scale, Cronbach's α = 86)

Our top managers from every function regularly visit our current and prospective customers [b]

We freely communicate information about our successful and unsuccessful customer experiences across all business functions

All of our business functions are integrated in serving the needs of our target markets

All of our managers understand how everyone in our business can contribute to creating customer value

All functional groups work hard to thoroughly and jointly solve problems

C. NP Success

Relative sales, relative market share, relative return on investment, or relative profits (seven-point, three-item scale each, Song and Parry 1997a, Cronbach's αs = 89, 91, 91, 92, respectively)

Relative to your firm's other new products, this product is very successful in terms of [sales, market share, return on investment, or profits] [a]

Relative to competing products in the market, this product is very successful in terms of [sales, market share, return on investment, or profits] [a]

Relative to your firm's original objectives for this product, this product is very successful in terms of [sales, market share, return on investment, or profits] [a]

Meeting objectives (seven-point, three-item scale, adapted from Kleinschmidt and Cooper 1991 and Page 1993, Cronbach's α = 77)

Relative to your firm's original objectives for this product, this product is very successful in terms of customer satisfaction

APPENDIX A
Continued

Relative to your firm's original objectives for this product, this product is very successful in terms of technological advancement

Relative to your firm's original objectives for this product, this product is very successful in terms of overall performance

D. Control Variables

Market Potential (seven-point, four-item scale, Song and Parry 1997a, Cronbach's α = 77)

There are many potential customers for this product to provide a mass-marketing opportunity

Potential customers have a great need for this class of product[b]

The dollar size of the market (either existing or potential) for this product is very large

The market for this product is growing very quickly

Technological Turbulence (seven-point, three-item scale, Jaworski and Kohli 1993, Cronbach's α = 88)

The technology in our industry is changing rapidly

Technological changes provide big opportunities in our industry

A large number of new product ideas have been made possible through technological breakthroughs in our industry

Technological development in our industry are rather minor (reverse coded)

Firm Size (one-item scale)

The number of employees in a firm

---

[a] We evaluated constructs in brackets separately

[b] We removed these items from the final analysis because of the low item-to-total correlations

APPENDIX B
Combined Model: Standardized Coefficients (s.e.) (Estimation Results [N = 312])

	Endogenous Variables				
Structural Model	**NP Creativity**	**MP Creativity**	**MPO**	**FPO**	**QPO**
H_1 Customer orientation	15 (05)	22** (09)			
H_2 Competitor orientation	07 (05)	12 (09)			
H_3 XFI	26** (05)	19**(08)			
H_4 NP creativity			31** (21)	34** (24)	48** (25)
H_4 MP creativity			21** (09)	13** (09)	15* (08)
Control Variables					
Market potential			– 03 (05)	10* (06)	14** (05)
Technological turbulence			– 08 (05)	– 10 (06)	– 05 (05)
Firm size		01 (01)	– 01 (01)	01 (01)	
SMC (R^2)	15	22	17	15	28

Measurement Model					
Customer orientation	CustOri1	75	MPO	Mpo1	78
	CustOri2	79 (08)		Mpo2	87 (07)
	CustOri3	82 (07)		Mpo3	86 (07)
	CustOri4	68 (07)		Mpo4	85 (07)
	CustOri5	61 (09)		Mpo5	84 (07)
				Mpo6	89 (07)
Competitor orientation	CompOri1	67	FPO	Fpo1	84
	CompOri2	80 (11)		Fpo2	82 (05)
	CompOri3	69 (11)		Fpo3	91 (05)
	CompOri4	54 (10)		Fpo4	88 (05)
				Fpo5	82 (05)
				Fpo6	92 (05)
XFI	Xfi1	66	QPO	Qpo1	80
	Xfi2	80 (10)		Qpo2	65 (07)
	Xfi3	86 (11)		Qpo3	85 (07)
	Xfi4	80 (10)			
NP creativity	Npn1	33	Market potential	Mp1	70
	Npn2	34 (24)		Mp2	84 (09)
	Npn3	33 (23)		Mp3	73 (08)
	Npn4	32 (22)			
	Npm1	88	Technological turbulence	Tt1	77
	Npm2	84 (27)		Tt2	85 (06)
	Npm3	88 (28)		Tt3	83 (07)
	Npm4	79 (29)		Tt4	72 (08)

APPENDIX B
Continued

Measurement Model		
MP creativity	Mpn1	61
	Mpn2	59 (10)
	Mpn3	61 (11)
	Mpn4	59 (10)
	Mpm1	84
	Mpm2	83 (09)
	Mpm3	83 (09)
	Mpm4	82 (09)

*$p < 10$
**$p < 05$
Notes For the measurement model, all standardized coefficients are significant at $p < 05$ Fit statistics χ^2 (d f) = 3442 42 (884), NFI = 92, RFI = 92, IFI = 94, TLI = 94, and RMSEA = 10

APPENDIX C
Component-wise Model: Standardized Coefficients (s.e.)
(Estimation Results [N = 312])

	Endogenous Variables						
Structural Model	**NP Novelty**	**NP Meaning**	**MP Novelty**	**MP Meaning**	**MPO**	**FPO**	**QPO**
Customer orientation	– 23** (13)	19* (09)	08 (12)	23** (11)			
Competitor orientation	33** (14)	03 (10)	23** (13)	09 (12)			
XFI	08 (12)	22** (09)	14 (12)	18** (11)			
NP novelty					10 (06)	03 (07)	17** (06)
NP meaningfulness					28** (08)	32** (09)	41** (08)
MP novelty					– 06 (07)	– 05 (08)	01 (07)
MP meaningfulness					28** (08)	16** (09)	14* (07)
Control Variables							
Market potential					– 03 (05)	10 (06)	11** (05)
Technological turbulence					– 08 (05)	– 11* (06)	– 04 (05)
Firm size					– 01 (01)	– 01 (01)	01 (01)
SMC (R^2)	07	14	16	19	20	17	31

Measurement Model					
Customer orientation	CustOri1	75	MP meaning	Mpm1	86
	CustOri2	79 (09)		Mpm2	88 (04)
	CustOri3	81 (08)		Mpm3	84 (05)
	CustOri4	68 (07)		Mpm4	82 (05)
	CustOri5	61 (09)			
Competitor orientation	CompOri1	67	MPO	Mpo1	78
	CompOri2	80 (11)		Mpo2	86 (07)
	CompOri3	68 (11)		Mpo3	86 (07)
	CompOri4	53 (08)		Mpo4	85 (07)
				Mpo5	84 (07)
				Mpo6	89 (07)
XFI	Xfi1	65	FPO	Fpo1	84
	Xfi2	80 (10)		Fpo2	81 (05)
	Xfi3	86 (11)		Fpo3	91 (05)
	Xfi4	81 (10)		Fpo4	88 (05)
				Fpo5	82 (05)
				Fpo6	92 (05)
NP novelty	Npn1	75	QPO	Qpo1	79
	Npn2	88 (08)		Qpo2	66 (73)
	Npn3	85 (08)		Qpo3	84 (73)
	Npn4	76 (08)			

APPENDIX C
Continued

Measurement Model					
NP meaning	Npm1	89	Market potential	Mp1	70
	Npm2	85 (05)		Mp2	84 (09)
	Npm3	88 (05)		Mp3	73 (08)
	Npm4	79 (05)			
MP novelty	Mpn1	82	Technological turbulence	Tt1	77
	Mpn2	83 (06)		Tt2	85 (06)
	Mpn3	84 (06)		Tt3	83 (07)
	Mpn4	80 (06)		Tt4	72 (08)

*$p < 10$
**$p < 05$

Notes For the measurement model, all standardized coefficients are significant at $p < 05$ Fit statistics χ^2 (d f) = 2659 94 (1226), NFI ($\Delta 1$) = 95, RFI ($\rho 1$) = 94, IFI ($\Delta 2$) = 97, TLI ($\rho 2$) = 97, and RMSEA = 06

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Kusum L Ailawadi, Donald R Lehmann, and Scott A Neslin have been selected as recipients of the Harold H Maynard Award for their article "Revenue Premium as an Outcome Measure of Brand Equity," which appeared in the October 2003 (Vol 67, No 4) issue of the *Journal of Marketing* This article was chosen by members of the *Journal of Marketing* Editorial Review Board for its significant contribution to marketing theory and thought The award carries a plaque and a cash prize The award is presented at the American Marketing Association's Summer Marketing Educators' Conference, scheduled to be held August 6–9, 2004, at the Marriott Copley in Boston

- Kusum L Ailawadi is Assistant Professor of Business Administration, Tuck School of Business, Dartmouth College
- Donald R Lehmann is George E Warren Professor of Business, Graduate School of Business, Columbia University
- Scott A Neslin is Albert Wesley Frey Professor of Marketing, Tuck School of Business, Dartmouth College

MARKETING SCIENCE INSTITUTE/H. PAUL ROOT AWARD

Werner J Reinartz and V Kumar have been selected as the recipients of the MSI/H Paul Root Award for their article "The Impact of Customer Relationship Characteristics on Profitable Lifetime Duration," which appeared in the January 2003 (Vol 67, No 1) issue of the *Journal of Marketing* This article was chosen by members of the *Journal of Marketing* Editorial Review Board for its significant contribution to the advancement of the practice of marketing The award carries a certificate and a cash prize The award is presented at the American Marketing Association's Summer Marketing Educators' Conference, scheduled to be held August 6–9, 2004, at the Marriott Copley in Boston

- Werner J Reinartz is Assistant Professor of Marketing, INSEAD
- V Kumar is ING Aetna Chair Professor and Executive Director, ING Aetna Center for Financial Services, Department of Marketing, School of Business Administration, University of Connecticut

NOMINATIONS SOUGHT FOR *JOURNAL OF MARKETING* EDITOR

The American Marketing Association is seeking nominations and applications for the editor-designate of the *Journal of Marketing*, the AMA's premier quarterly journal dedicated to the development, dissemination, and implementation of marketing concepts, practice, and information The new editor's term begins July 1, 2005, following the term of current editor Ruth Bolton, and ends June 30, 2008 The major criteria in evaluating candidates are the following

- •Recognized authority in the area of marketing,
- •Evidence of administrative ability,
- •Commitment by the potential editor's employer for resource support,
- •Agreement to operate within AMA policies and strategic guidelines, and
- •Willingness to make the time commitment

Nominations, applications, and questions should be sent no later than August 31, 2004, to Russell S Winer, Stern School of Business, 44 West 4th Street, New York, NY 10012, or by e-mail to rwiner@stern nyu edu

Correction

In "Reducing Assortment An Attribute-Based Approach," by Peter Boatwright and Joseph C Nunes in the July 2001 (Vol 65, No 3) issue of *Journal of Marketing*, there was a coding error that inflated sales for the final month of the data set The accompanying table includes updated results after the authors reestimated the model using the corrected data

Although the central goal of the article was to examine how different types of changes in product assortment might affect sales differently, Boatwright and Nunes reported two sets of results The first set of results pertained to the average change in sales across categories, the second set of results considered how different types of assortment reductions affected purchase behavior

A single parameter was affected by the coding error, that which measured the average change in sales for the category The altered parameter is shown in the second line of the accompanying table, θ Rather than the results showing an 11% sales increase in sales (e^{104}), the results with the corrected data reveal a sales increase of 1 5%, which is not statistically significant The rest of the parameters and conclusions were unaffected

TABLE 2
Parameter Estimates in Model of Sales (S_{hjt})

	Updated			Former		
		Standard			Standard	
	Estimate	Error	*p*-Value	Estimate	Error	*p*-Value
$\bar{\kappa}$	1 600	0196	< 0001	1 592	0197	< 0001
$\bar{\theta}$	015	0135	2816	104	0139	< 0001
γ	314	0084	< 0001	324	0083	< 0001
p	597	0018		582	0018	
$\bar{\phi}$ *for*						
ITEMS	–9 082	5793	< 0001	–8 601	5447	< 0001
ITEMS^2	10 069	5993	< 0001	9 805	5614	< 0001
SIZE	– 134	1634	4120	– 208	1536	1766
SIZE^2	435	271	1100	400	2553	1180
BRANDSIZE	2 983	4808	< 0001	2 419	4480	< 0001
BRANDSIZE^2	–3 122	5569	< 0001	–2 629	5194	< 0001
BRAND	1 444	2259	< 0001	1 192	2107	< 0001
BRAND^2	–3 001	2931	< 0001	–2 629	2740	< 0001
MKTSHR	1 023	2799	0003	1 063	2631	< 0001
MKTSHR^2	–3 429	4854	< 0001	–3 540	4539	< 0001
FLAVOR	1993	1339	1380	335	1261	0084
FLAVOR^2	– 749	2594	0043	–1 040	2423	< 0001
PRCCHG	2 8235	3065	< 0001	2 783	2958	< 0001

Detelina Marinova

Actualizing Innovation Effort: The Impact of Market Knowledge Diffusion in a Dynamic System of Competition

This study focuses on the dynamic process that governs the impact of market knowledge diffusion on innovation effort and its subsequent effect on firm performance. First, the author proposes that three aspects of market knowledge (knowledge level, knowledge change, and extent of shared knowledge about customers and competitors) influence innovation effort. In so doing, she explicitly models the dynamic process of competition, including heterogeneity in interdependence of innovation across competitors, firm-specific inertial tendency in innovation, and feedback effects reflected in satisfaction with past performance. Second, within a partial adjustment model of performance, the author studies the role of shared market knowledge and firm size in the translation of innovation effort into firm performance over time. She tests the conceptual framework with longitudinal quasi field experiments based on a Markstrat simulation exercise, including a main experiment and three validation studies. The results reveal a dynamic system in which some aspects of market knowledge diffusion propel innovation, whereas satisfaction with past performance hinders innovation effort. Furthermore, the results show that innovation effort, by itself, does not affect firm performance. In the context of the study, total shared market knowledge helps smaller firms actualize better returns from their innovation effort than larger firms.

At a fundamental level, firms act on the basis of their market knowledge: their knowledge of customers and competitors. As a result, the concepts of knowledge sharing (e.g., Hoopes and Postrel 1999; Senge 1993) and organizational learning (e.g., Cyert and March 1963; Dickson 1992) have gained substantial attention from scholars and business practitioners (e.g., Gates 1999). In general, an organization's ability to recognize the value of new information, assimilate it, and use it strategically is regarded as crucial for its ability to innovate (see Cohen and Levinthal 1990) and to gain performance advantages (Day 1997). In practice, organizations implement a team approach in developing new products to ensure organizationwide knowledge acquisition and dissemination. It is expected that information that resides in isolated pockets in the organization will become shared over time, thus leading to better decision making.

The objective of this article is to investigate the dynamic process that governs the impact of market knowledge diffusion on innovation effort and subsequent firm performance. The article also aims to close three gaps that are currently evident in research on market knowledge and innovation. First, as do related organizational processes, innovation evolves over time and thus requires the use of knowledge in a dynamic setting. However, empirical research in several disciplines—including marketing, management, and organizational behavior—has largely been guided by cross-sectional analyses of a key informant's perceptions of strategic orientation, innovation, and performance. That is, there has been no systematic conceptualization or longitudinal assessment of the dynamic process of market knowledge diffusion and its impact on innovation and subsequent performance. Lee (2003) notes that success in innovation-driven strategic divergence can be achieved by the capture of internal and external knowledge spillovers, but no conceptual or empirical work has explicated this process.

Second, market knowledge diffusion is a function of information acquisition, which is shaped over time by the dynamics of product diffusion and firms' previous innovative activities. Although prior research recognizes general time dependence in performance outcomes (e.g., Boulding 1990; Jacobson 1990), few studies have accounted for firm-specific inertial tendency in innovation (e.g., Bayus, Erickson, and Jacobson 2003). I suggest that to diagnose how a firm's own market knowledge and strategic actions uniquely drive its innovation, it is necessary to account for firm-specific inertial tendencies over time. Ignoring of firm-specific inertial tendencies can lead to erroneous conclusions regarding the impact of market knowledge diffusion on innovation and subsequent performance.

Third, prior research has failed to consider the implications of a competitive system in which the actions of a firm's competitors influence the firm's strategic actions,

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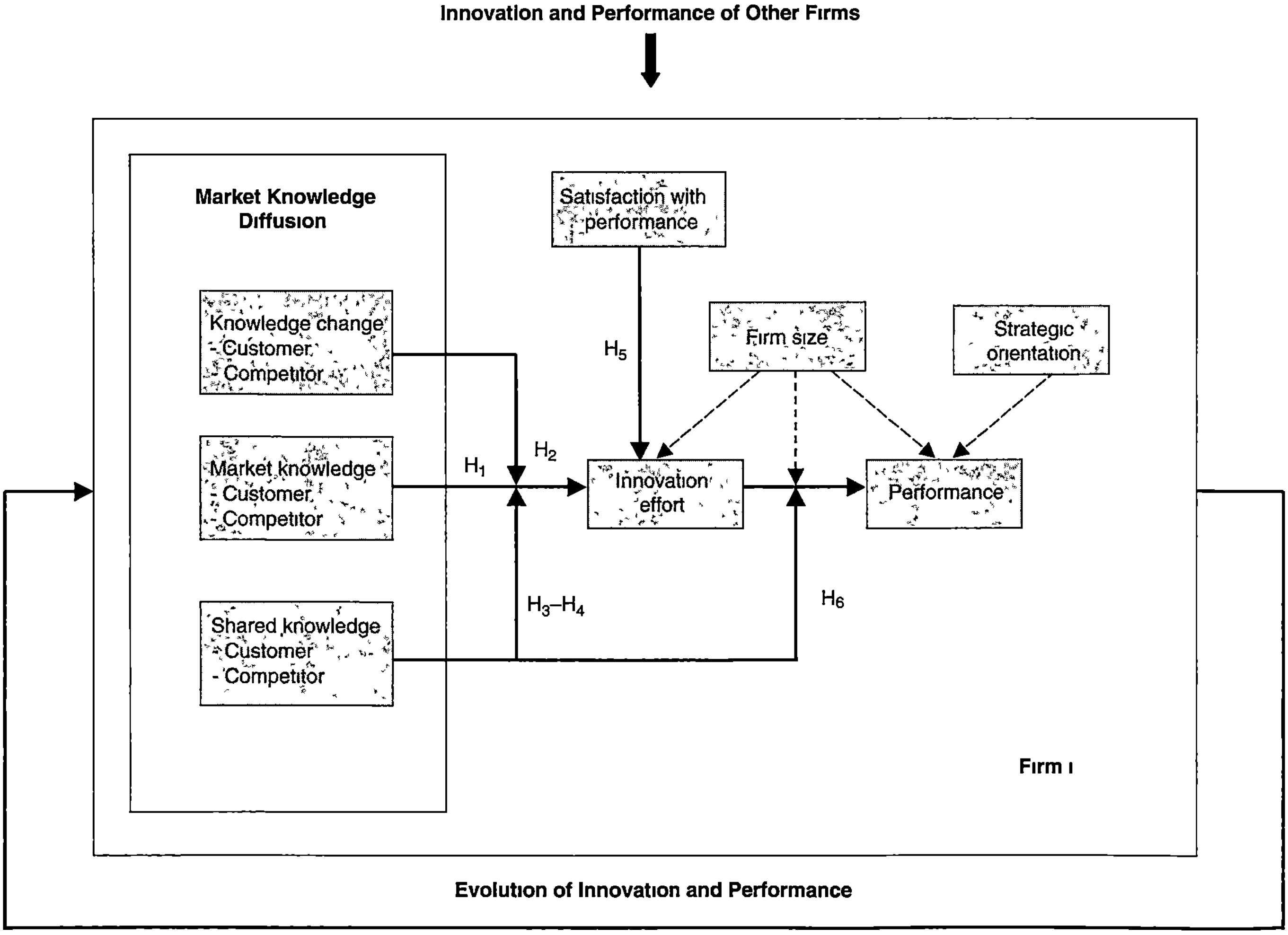
such as the dynamic use of market knowledge. Competitors often try to emulate the performance of successful others (Dickson 1992), but not all firms are equally good at identifying the explanatory mechanisms that underlie success. Two firms that follow similar strategies in using and managing market knowledge are likely to experience greater interdependence than are two firms that follow different strategies. To understand how a firm's own market knowledge and strategic actions drive its innovation or performance over time, it is necessary to account for the interdependence in actions and outcomes across competitors.

In an important departure from the extant literature, I adopt a longitudinal perspective that examines the evolution of market knowledge, innovation, and performance over time. I conceptualize market knowledge diffusion as the dynamics of market knowledge level, change in market knowledge, and shared market knowledge among strategic decision makers, and I subsequently develop and test hypotheses about these constructs' impact on innovation effort (Figure 1 depicts the tested relationships). I isolate the impact of market knowledge diffusion within the firm by accounting for innovation interdependence among firms, firm-specific proneness to inertia in innovation, and market feedback effects. I then develop a dynamic model of firm performance that reveals the unique role of decision makers' shared market knowledge in translating innovation effort into performance. Finally, to test the conceptual framework, I conduct longitudinal quasi field experiments in the context of the Markstrat simulation.

In addition to extending research in marketing, this study also has managerial implications. It calls attention to the role and relative importance of different aspects of market knowledge diffusion in strategic decision-making teams. Although many organizations are attempting to maximize their market knowledge (U.S. firms spend approximately $6 billion per year on market research information, according to the American Marketing Association), others are questioning its payoffs and impact on the bottom line (Sutcliffe and Weber 2003). Sutcliffe and Weber (2003) suggest that accurate market knowledge actually hurts performance and advise against reliance on it. The present research contributes to this debate by postulating three distinct aspects of market knowledge diffusion and by demonstrating the roles they play in generating performance.

FIGURE 1
Conceptual Framework



Market Knowledge Diffusion and Innovation Effort

Researchers have long suggested that markets operate to disseminate information rapidly to interested parties (von Hayek 1989) However, not all new market information becomes part of the intraorganizational knowledge-diffusion process I suggest that it is the very mechanism of intraorganizational knowledge diffusion that produces the observed stop-and-go, or interrupted, pattern of innovation generation (Chandrashekaran et al 1999, Dickson 1996, Hunt and Morgan 1995) If markets are constantly changing (Dickson 1992, Hunt and Morgan 1995) and if innovation drives change and firm success (Schumpeter 1942), then market knowledge, change in market knowledge, and shared market knowledge should enhance innovation effort By adopting the premise that knowledge ultimately resides at the level of the individual strategic decision maker, this research offers a microlevel perspective on market knowledge diffusion The premise aligns with Cyert and March's (1963) theoretical perspective of organizations as comprising individual members who learn and share knowledge with others and whose knowledge drives the specific investments of strategic decision-making teams The premise is also consistent with the notion that market knowledge is information-based knowledge (Polanyi 1967) that resides with the individual decision maker (Spender 1996)

Definitions

In defining knowledge, and specifically market knowledge, I draw on the work of Hammond and Summers (1972) and maintain that knowledge reflects the extent of a subject's accurate detection of a task's properties A decision maker who can correctly identify customer preferences and competitors is deemed knowledgeable about customer preferences and competitors To specify the domain of market knowledge, I build on the work of Day and Nedungadi (1994, p 32), who note that "the two most salient features of a competitive market are customers and competitors" Market factors such as competition and demand have been recognized as crucial determinants of organizational phenomena such as innovation generation (e g , Kessler and Chakrabarti 1996, Porter 1995) At a fundamental level, knowledge of the market is necessary to determine the needs and wants of target markets and to satisfy them better than the competition can (Kotler 2000) Therefore, in this research, the term "market knowledge" implies knowledge about customers and competitors

Change in market knowledge refers to the magnitude of change in decision makers' knowledge about customers and competitors between two points in time This definition focuses on the absolute change in knowledge over time rather than the direction of change, which makes it possible to separate the effects of knowledge accuracy (captured by market knowledge, as defined previously) from the effects of the magnitude of change in market knowledge Change in market knowledge may be viewed as a consequence of adjustment to inaccuracies of knowledge compared with the "objective" reality in the market Furthermore, this change may be due to insights beyond current available information and based on a decision maker's anticipating the market or uniquely integrating knowledge across different market aspects Decision makers' desire to make good decisions motivates them to update and change their knowledge about the marketplace, but inertial forces that result from the cyclical nature of the market evolution system, as well as people's bounded rationality and cognitive makeup, deter them from changing their knowledge Thus, the magnitude of knowledge change also indicates decision makers' flexibility and willingness to change the status quo Carlile (2002) points out that when decision makers find knowledge that proves useful, they tend to continue to rely on it and are less willing to update it to accommodate new developments For example, although executives at GE Lighting might receive quarterly syndicated data on retail lighting sales and preferences, not all of them will examine all or even some of the data all the time, and they are likely to interpret the data differently The executives' degree of attention to the data and their interpretation of it will be reflected in their knowledge about the market and its change over time

Furthermore, decision makers may or may not update their knowledge on the basis of communication and information exchange with others Thus, at any given point, they will have a different extent of shared knowledge about consumers' retail lighting preferences This research adopts the theoretical perspective of Hoopes and Postrel (1999, p 838), who define shared knowledge as "facts, concepts, and propositions [that] are understood simultaneously by multiple agents The word 'shared' is used as an adjective rather than a participle, that is, we mean only that the knowledge held by two or more individuals is the same, not necessarily that one person has communicated it to the other Common knowledge might be a more precise expression, but that term already has a specific technical definition in game theory, as well as a different colloquial meaning" Thus, shared market knowledge among a group of decision makers is the extent of overlap in individual decision makers' market knowledge

In terms of studying innovation, research in marketing and management has focused primarily on innovation output, as measured by new product success (e g , Ayers, Dahlstrom, and Skinner 1997) and time to market (Ittner and Larcker 1997) Research in economics has focused more on innovation input, such as research and development (R&D) investments (Miyagiwa and Ohno 1999) and innovation effort (Cheng and Tao 1999, Cohen and Klepper 1996a, b) Because product innovations arise only if a particular level of effort is exerted to bring them to market, the generative process by which innovations emerge needs to be considered Thus, I focus on innovation effort in this investigation

The Effect of Market Knowledge on Innovation Effort

Both researchers and practitioners recognize in broad terms that knowledge is an important factor in the creation of competitive success over time (Carlile 2002) For example, researchers studying organizational memory and absorptive capacity (Cohen and Levinthal 1990, Moorman and Miner

1997) have argued, albeit at a macro level, that accumulation of strategic information increases the capacity of organizations to interpret new information and to make strategic decisions, especially if the new information is related to the previously accumulated information Research in cognitive psychology has shown that people have a fixed capacity to process information (Sternberg 1996), which means that accumulation of strategic information may diminish the ability to interpret new information, unless the new information is related to what has been previously learned These perspectives together suggest that existing strategic information is more likely to facilitate the interpretation of new information if the existing information is processed, internalized, and converted to knowledge In other words, market knowledge (rather than information) has positive effects on innovation effort

H_1 Market knowledge has a positive effect on innovation effort

The Effect of Change in Market Knowledge on Innovation Effort

In discussing the development of new products, Webster (1997, p 52) argues that "the product is a variable tailored to changing needs of carefully selected customers As the customer changes, so must the product, and the organization that provides that product must have built-in flexibility and adaptiveness" Researchers who study the evolution of markets suggest that competitive advantage ensues from a focus on change rather than on static market conditions (e g , Dickson 1996, Senge 1993) Similarly, Teece, Pisano, and Shuen (1997) argue that organizations should focus not on their current positions and market capabilities but on dynamically changing these over time Furthermore, it has been strongly argued that the only way to achieve a sustained competitive advantage is through continuous innovation (Schumpeter 1942) These streams of work suggest that the enhancement of the organizational innovation effort requires constant monitoring of the changes in market conditions Through the monitoring of market condition changes, decision makers enhance their market knowledge Thus, the degree to which strategic decision makers' knowledge about key marketplace factors *changes* over time influences organizational innovation effort For example, if decision makers believe that customer preferences have changed substantially, their innovation effort at that point in time will be more extensive than when they perceive customer preferences as having changed to a lesser degree A change in knowledge about the actions of close industry competitors has a similar effect If decision makers perceive movement on the part of their competitors, they are more likely to expend effort innovating than they would in the absence of competitors' actions

However, how much change in market knowledge stimulates innovation is likely to depend on the original level of market knowledge Consider two firms that evidence identical changes in market knowledge If these firms begin at different levels of knowledge, they will have different returns from their knowledge change, and the advantage will be with the firm that has the higher original level of market knowledge, because a firm's original knowledge serves as a basis for integrating new knowledge Teece (2001, p 129) argues that "Knowledgeable people and organizations can frame problems and select, integrate, and augment information to create understanding and answers—[that is,] the interpretation of information and its consequent use are determined by the existing knowledge base" A firm that has little knowledge but demonstrates a change in knowledge does not possess a foundation to use this newly acquired knowledge Therefore

H_2 A change in decision makers' market knowledge (a) results in an increase in innovation effort and (b) moderates the impact of the level of market knowledge on innovation effort

Direct and Moderating Effects of Shared Market Knowledge

Prior conceptual work has suggested that the creation and sharing of new knowledge is essential to firms' fostering innovation (Chan and Mauborgne 1997) and building competitive advantage (Senge 1993, 1997) Hoopes and Postrel (1999) argue that unique patterns of shared knowledge are an important source of competitive advantage because they are difficult to purchase and take time to develop Likewise, in a discussion of learning among strategic decision makers, Argyris and Schon (1978, p 20) suggest that "[strategic decision makers'] work as learning agents is unfinished until the results of their inquiry are recorded in the media of organizational memory" Essentially, this will not occur until shared knowledge is in evidence Finally, Senge (1993, p 186) comments that "the most crucial mental models in any organization are those shared by key decision makers"

Despite the widespread belief that shared knowledge enhances innovativeness, empirical evidence is sparse In one of the few studies that examine actual shared knowledge, Hoopes and Postrel (1999) find that shared knowledge reduces glitches in new product development Notably, they find that shared knowledge helps significantly reduce project delays and costs associated with lost customer goodwill Miller, Burke, and Glick (1998) also imply that shared market knowledge offers potential benefits for innovation Although they do not explicitly focus on actual shared knowledge, they find that cognitive diversity in decision-making teams inhibits strategic long-term planning Overall, however, researchers have not investigated effects of actual shared market knowledge on important organizational phenomena such as innovation and performance Instead, they have referred to key respondents' perceptions of consensus about strategic issues as shared knowledge and to diversity in team composition (in terms of demographic factors and functional background) as heterogeneity in organizational knowledge

I further propose that a high degree of shared market knowledge among decision makers intensifies the effect of the knowledge on the exerted innovation effort Although decision makers' unified knowledge of market conditions may benefit the application of that knowledge in fostering innovation, wide acceptance of inaccurate information may hinder innovative activities This reasoning suggests an interaction between the level (accuracy) of decision makers' market knowledge and the extent of shared knowledge among them Finally, changes in decision makers' knowledge of customers and competitors are likely to stimulate or dampen innovation effort, depending on the extent to which the new knowledge is shared among the decision makers In other words, changes in market knowledge are likely to intensify the need to innovate, but this relationship will be stronger or weaker depending both on whether market knowledge fosters or subdues innovation effort and on the extent of shared knowledge among decision makers

> H_3 An increase in shared knowledge about customers and competitors has a positive effect on innovation effort
>
> H_4 The extent of shared knowledge about customers and competitors moderates the impact of (a) market knowledge and (b) changes in market knowledge on innovation effort

Competitive Interdependence, Inertia, and Feedback Effects

Several forces constitute the market landscape that shapes the coevolution of market knowledge diffusion, firm innovation, and firm performance To isolate the effects of market knowledge dynamics on innovation effort and the subsequent effect on performance, it is necessary to consider the role of these forces

Competitive Interdependence

Prior research has shown that a firm's own learning is not the only factor that determines which strategies (e g , investing in innovation) it adopts and how successful it is, firms also are influenced by the evolving strategic actions and performance of their competitors (Ansoff 1984, Porter 1995) Two firms may implement similar strategies or evidence a similar level of market knowledge, change in knowledge, or knowledge sharing, but they may recover different returns on their strategies simply because they are differently embedded in the competitive landscape (see Dickson 1992) Although the literature shows that the degree of competition and imitation in a firm's market affects its decision to invest in learning, research on organizational and managerial knowledge does not incorporate this competitive aspect (Grandori and Kogut 2002)

Inertia

Against the backdrop of research that has acknowledged the ubiquity of inertia in innovation effort (Bayus, Erikson, and Jacobson 2003, Geroski, Machin, and Van Reenen 1993, Greve 1999, 2002, Miller and Chen 1994), I recognize that firms differ widely in their ability to scan the environment, to make correct cause–effect inferences in environments characterized by the delayed effects of prior strategic actions, and to take action based on these inferences (Senge 1993) Similarly, although prior learning through the adoption and replication of existing action is crucial for future actions (Hargadon and Fanelli 2002), firms differ in their abilities to leverage previous innovation effort Therefore, I capture each firm's individual proneness to inertia, which reflects the extent to which each firm's current levels of innovation effort depend on its previous levels

Feedback Effects: The Role of Satisfaction with Past Performance

Drawing from the conceptualization of the cyclical process of market evolution, I recognize that market performance feedback shapes decision makers' satisfaction with past performance, which continuously drives the pattern and speed of their knowledge acquisition In turn, this influences future strategic actions, such as innovation effort and resultant performance However, the effect of satisfaction with past performance can be quite complex On the one hand, prior success (failure) may breed more success (failure) as a result of self-reinforcing mechanisms (see March and Sutton 1997) It is this "nothing succeeds like success" logic that underlies the Schumpeterian hypothesis In competitive markets, firms whose products enjoy high growth in demand are likely to become more innovative because they are motivated to protect the monopoly power that success engenders (Dosi 1988) On the other hand, success may induce complacency, and failure would result in problem-solving activities aimed at reversing poor performance, these countervailing tendencies then precipitate feedback effects Support for the latter perspective comes from research in marketing (Chandrashekaran et al 1999) and organizational behavior (e g , Audia, Locke, and Smith 2000, Isen and Baron 1991, Miller and Chen 1994) For example, Chandrashekaran and colleagues (1999) find that increased new product diffusion rates negatively affect future innovation generation in a firm They offer but do not test the perspective that decision makers are prone to success-driven complacency, which arises in part from their satisfaction with the performance of existing products in the marketplace This perspective implies that managerial knowledge of marketplace feedback results in a continually updated sense of satisfaction with firm performance, which ultimately shapes the extent of innovation effort over time Overall, the previous two perspectives suggest a U-shaped effect of satisfaction with past performance, such that innovation effort is highest at lower and higher levels of satisfaction

> H_5 Satisfaction with performance has a U-shaped effect on innovation effort

From Innovation Effort to Performance

Apart from the question of how specific aspects of market knowledge diffusion and their interplay at the level of individual decision maker influence innovation effort over time, an important issue is the following When does innovation effort pay off? I subsequently discuss the mechanism that underlies firm performance, specify a model that tests the translation of innovation effort into performance outcomes, and propose that total shared market knowledge moderates the impact of innovation effort on performance

What Underlies Dynamic Firm Performance?

A firm may have the market knowledge and resources to achieve a certain level of performance, but it may fail to reach its potential for various reasons, including weak deployment of resources, poor implementation, unexpected competitive actions, and stochastic factors such as random opportunities and obstacles Furthermore, as I discussed previously, firms differ widely in their ability to make correct cause–effect inferences in environments characterized by the delayed effects of prior strategic actions Thus, when facing a gap between potential and realized performance, firms differ in their ability to sense such shortcomings and to take action to improve their performance Although some firms may be acutely aware that their resources should be translating into better performance, previous research indicates that most firms are "gripped by inertia, which dulls and retards responses in a dynamic market" (Chandrashekaran et al 1999, p 97) Indeed, the concept of inertia-induced underperformance is the basis of most of the research that attempts to explain why firms that have ample resources in one technological regime often fail to lead in another (e g , Porter 1995)

Inertia manifests itself in dynamic firm performance by causing realized performance at time t to fall continually short of a potential achievable performance at time t That is, at any point in time, realized performance only partially adjusts to the discrepancy between previously realized performance and potential performance Moreover, because firms are different, the rate of adjustment is firm specific Consistent with Leeflang and colleagues (2000), I specify the following autoregressive partial-adjustment model (see the Appendix)

$$(1) \qquad \mathrm{PERF}_{it} = \rho_i \mathrm{PERF}_{i,t-1} + \mathbf{X}_{it}\beta - \rho_i \mathbf{X}_{i,t-1}\beta + \eta_{it},$$

where PERF_{it} denotes the performance of firm i at time t, and $\eta_{it} \sim N(0, \sigma_i^2)$ Four issues warrant comment First, in this specification, when $\rho_i = 0$ (the adjustment rate is large), there is no inertia In turn, when $\rho_i = 1$, there is no adjustment in performance, and a condition of complete inertia exists Second, each firm has a unique volatility associated with performance (note that the variance of η_{it} is firm specific) Third, $\mathrm{cov}(\eta_i, \eta_j) = \sigma_{ij}^2$ This accounts for the unique interdependence in performance across firms Fourth, although I assume a certain specification for η_{it}, I explicitly test for serial correlation

When Does Innovation Effort Pay Off?

Prior research in economics has found that innovation effort has a positive effect on performance (for a review, see Cohen and Klepper 1996a, b) However, a meta-analysis in the marketing literature (Szymanski, Bharadwaj, and Varadarajan 1993) does not find that innovation effort (in the form of R&D) has a positive impact on new product outcomes I advance a contingency perspective to explain the effect of innovation effort on performance

Organizational theorists have long acknowledged that knowledge resides in individual decision makers (Simon 1991) However, a person does not think in isolation but interacts with others, so that at the level of the strategic team and organization there is varied alignment of individually held schemas (Hargadon and Fanelli 2002) Reverse alignment of schemas ensures continual knowledge sharing, which enables decision makers to act with unity of purpose In the marketing literature, scholars have built on these streams of research and have argued that "market knowledge is not fully captured in a usable form until the lessons and insights are transferred beyond those who gain the experience" (Day 1994, p 44) Guided by this line of research, I suggest that the total shared market knowledge facilitates the translation of innovation effort into performance A firm that has a high level of total shared market knowledge acts with a greater unity of purpose in making investment decisions than does a firm that has a low level of total shared market knowledge Thus, I expect that an interaction of innovation effort and total shared market knowledge shapes firm performance Prior conceptual research has recognized that the sharing of knowledge leads to performance advantages (e g , Argote 1999, Senge 1993, 1997) However, this research has conceptualized a main effect of shared knowledge on performance and has not tested this empirically For example, Frank and Fahrbach (1999, p 254) maintain that processes associated with the pattern of interaction and the act of information sharing among organizational members "represent the geological forces that shape the landscape on which organizational productivity is built" Furthermore, Cannon-Bowers, Salas, and Converse (1993) suggest that shared mental models contribute to more effective teams

H_6 The impact of innovation effort on performance increases as the extent of total shared market knowledge in a firm increases

Control Variables

Prior research has recognized the influence of firm size on innovation and competitive processes (e g , Cohen and Klepper 1996a, b, McKee, Varadarajan, and Pride 1989) Resource-based views of the firm (e g , Barney 1991), including the resource-advantage theory of competition (Hunt and Morgan 1995), suggest that resources possessed by organizations lead to positions of competitive advantage, which eventually translate into innovation-driven superior performance Others suggest that small firms are more innovative than large firms because they are less prone to bureaucratic inertia (e g , Baldridge and Burnham 1975) or that the very success that yields greater financial resources serves to create complacency, which hinders subsequent innovation (e g , Audia, Locke, and Smith 2000) Consequently, I control for firm size in my model of innovation effort

Prior work in economics also supports the notion that firm size influences return on innovation (Cohen and Klepper 1996a, b) Therefore, in addition to a main effect of firm size, I expect that there is an interaction between innovation effort and firm size Inclusion of this interaction allows for an examination of the relative impact of firm size (compared with the impact of shared knowledge) in the translation of innovation effort into firm performance, and it helps empirically uncover sources of competitive advantage that prior research might have ignored Finally, prior research in marketing has also documented that strategic orientation has an effect on firm performance (e g , Gatignon and Xuereb 1997, Voss and Voss 2000), thus, I include strategic orientation in the study

Method

To address the focal research questions, a controlled setting is required that allows for the explicit capture, over time, of market knowledge and its role in actualizing innovation in a dynamic system of market evolution I thus turned to a quasi field experiment the Markstrat3 simulation (Larreche and Gatignon 1999), which has been widely used as an empirical setting in prior research on managerial decision making (Clark and Montgomery 1998, 1999, Glazer, Steckel, and Winer 1989, 1990, 1992, Van Bruggen, Smidts, and Wierenga 1998)

The Markstrat setting is highly suitable for this research for several reasons First, the simulation provides objective information on all aspects of the marketplace This is crucial for assessing decision makers' market knowledge and thus meaningfully capturing the level of accurate market knowledge, the change in knowledge, and the extent of shared knowledge In addition, this research requires repeated measures of the various dimensions of each decision maker's knowledge over time, which precludes a cross-sectional survey method

Second, because the simulation makes it possible to observe the vector of independent variables before performance is known to the firms, there is no problem of contemporaneous correlation between the error term and the vector of independent variables Although in principle the research task can be accomplished by collecting longitudinal data through repeated interviews in an industrial setting, the issue of contemporaneous correlation remains, because it would be impossible to observe the multitude of relevant variables (e g , tangible and intangible performance incentives) that simultaneously affect the outcome and the variables of theoretical interest However, with a simulation, identical incentives are established for all participants, which is an essential requirement for the design of this study

Third, the simulation can be set up such that all teams begin in identical positions Consequently, variations that emerge in subsequent strategy and performance can be more easily linked to distinct capabilities across firms Fourth, the structure of all firms is identical and simple A team of four to six members is responsible for all decisions This structure controls for macrostructural effects on decision making and innovation

Participants are assigned to one of six teams, and each team is responsible for managing a firm in the Markstrat industry over a certain number of time periods (ten in the main study, which corresponds to ten years) At the start of the simulation, all firms have two products in the market. Throughout the course of the simulation, firms must make decisions about production, advertising, sales force, distribution, pricing, and product positioning for each product in each period Firms can also purchase any or all of a set of market research reports each period They can introduce new products (after the successful completion of R&D) and withdraw old ones from the market

Design

I performed two pretests using different industry settings, different subjects, and different points in time to assess the feasibility of data collection in such a setting, to examine how well the models generated estimates that could serve as a basis for subsequent triangulation, and to make necessary improvements in the data collection protocols Pretest 1 involved 17 part-time and full-time MBA students at a large Midwestern university The participants had an average of 8 7 years of work experience and an average age of 32 The data collection process was based on nine decision periods and was divided into two phases In the orientation phase (Periods 1–3), subjects focused on learning the various aspects of the simulation, and in the data collection phase (Periods 4–9), they completed, on an individual basis, questionnaires aimed at capturing their market knowledge at each point in time The panel data from this pretest came from 17 decision makers, in five teams, observed over six continuous time periods Pretest 2 helped refine the measures for knowledge on customer preferences and competition at the micro level The design was similar to that of the first pretest Participants were 12 full-time MBA students at a different large Midwestern university, with an average of 3 5 years of work experience and an average age of 24 4 The panel data from this pretest came from 12 decision makers, in four teams, observed over nine continuous time periods

For the main study, six teams, each of which contained four or five MBA students from a large Midwestern university, participated in a Markstrat3 simulation in which identical starting positions were used All teams competed in only one industry (Sonite) for the entire duration of the simulation (Entry into a second industry [Vodite] was prevented by making conditions for entry impossible to meet) Over two-and-a-half months, 25 participants provided data on their knowledge and perceptions of the marketplace The average age of the participants was 27 2 (standard deviation 3 61, range 21 to 33 years), and the average work experience was 5 7 years (standard deviation 3 67, range 1 to 14 years) [1] Before the actual simulation started, the participants were familiarized with the software and the mechanics of the simulation through a trial run of three decision periods

Questionnaires aimed at capturing relevant aspects of each decision maker's knowledge structure were administered every period in Periods 2–9 While participants were completing the questionnaire, they were not allowed to consult their notes or their team members To alleviate problems of diminishing interest and automatic response patterns, which are typical of repeated-measure questionnaires, participants were continually reminded that there were no right or wrong answers and that the questions aimed to uncover their perceptions of the dynamics in the market. In addition, the content of the questionnaires was varied (but contained the same key measures every decision period) to maintain participants' interest, and the questions captured the diversity of decision-making aspects well. Immediately after each team had made its decisions and before it received performance feedback, each decision maker's knowledge of the product-market factors and perceptions of the previous period's performance were measured. Therefore, the panel data for the analysis came from 25 decision makers, in six teams, observed over eight continuous time periods, which yielded 48 organization-period observations.

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[1] The average age is based on 24 participants, 1 participant did not report her age I also realized that study participants would be junior people in any organization However, I do not have reason to believe that seniority of decision makers moderates or changes the relationship between dynamics in market knowledge and innovation To check empirically whether this was the case in my data, I included the average work experience and age as main effects and interacted them with the variables in the innovation and performance model I did not find any significant interactions, that is, the reported parameter estimates remain unchanged

I also conducted three validations studies. In the first, decision makers participated in Markstrat without being surveyed at all during the simulation. This served two purposes. First, it validated the underlying generative mechanism of competitive dynamics, and second, it tested whether the process of repeated data collection influenced the dynamic system of competition. The panel data from this study were collected from 28 MBA students (not from the same university as the students who participated in the main study), with average work experience of three years, in five teams over nine time periods.

Because I also aimed to assess the robustness of the results, both by attempting to replicate them and by examining the cross-industry predictive ability of the estimates, I conducted two more validation studies in two different Markstrat industries. The second validation study involved 36 MBA students (average work experience of 7.3 years) in six teams over nine time periods, and questionnaires were administered for seven periods. The third study involved 15 MBA students (average work experience of 3.3 years) in four teams over nine time periods, and data were gathered for four periods.

Measures

Knowledge. Conceptually, knowledge is defined as the extent of the accurate detection of a task's properties; in the context of this study, it involves the accurate detection of customer preferences and competition. Specifically, in the Markstrat industry setting, critical properties are accurate identification of customer segment preferences or ideal points and competition. Because all teams ordered market research reports and spent time analyzing them, I considered the distinction between information and knowledge.

Conceptually, knowledge and information are different but related. In general, knowledge is considered interpreted information that is anchored in people's beliefs and commitment (Huber 1991). Knowledge also comprises such cognitive elements as beliefs, understanding, interpretation, and integration with previous knowledge. In the words of Bertels and Savage (1998, p. 17), "information only comes alive by our interpretation.... [W]e create meaning by distinguishing and valuing information." Although decision makers obtain market reports that list the ideal points and spend time reading reports, information needs to be integrated into their schemas and into their prior understanding of the market for it to become knowledge. If this information is not integrated with a person's existing understanding of the market and remembered for later retrieval, it is also less likely to be subsequently used. Moreover, teams (and decision makers) differ in terms of their ability to process, understand, and interpret this information. Yet the development and execution of successful strategy in Markstrat (also in general) requires the integration of many pieces of information. For example, information that addresses different elements of the competitive environment is located in different reports. Thus, decision makers need to be able to process and remember a piece of information to relate it to another when they encounter it and need to integrate it. In addition, successful performance requires marketing products that satisfy segment preferences. The greater the intensity of competition in a product market, the greater is the impact of the discrepancy between perceived characteristics of products and the "ideal" points of the target segment on sales. If decision makers understand the importance of this aspect of product marketing, target-segment ideal points will be highly salient to them, actively used, and more easily remembered.

Furthermore, teams also differ in diagnosing both the relative importance of different information that is available in the reports and the importance of the degree of accuracy of customer knowledge necessary to compete (and/or deemed important for their strategy). Given the availability of information, teams may have relatively inaccurate knowledge of the ideal points. For example, this occurs under the following three conditions. First, this occurs when teams believe that delivering a product that corresponds exactly to the ideal points of the segments is not needed and that being "close enough" is sufficient to compete in accordance with their objectives at a particular point in time (there is a variation in what "close enough" is; in the extreme case, it can mean dichotomization of the market in terms of high- and low-end products), and variation can exist across and within teams across time. Second, when teams believe that performance in the previous period suffered because they overlooked competition, they may spend more of their time analyzing competition and less time studying changes in customer preferences (decision makers also differ in their abilities to diagnose cause–effect relationships). Given fixed capacity to process information (Sternberg 1996) and limited time, their customer knowledge will likely be compromised and less accurate than knowledge of competition, especially if significant changes occurred in the market. Third, inaccurate knowledge can result from teams becoming complacent with their performance (Audia, Locke, and Smith 2000), in which case they are likely to be less sensitive and to pay less attention to changes that take place in the market. In this case, their customer knowledge will reflect previous ideal points, which are not updated and thus are not accurate.

Given the previous considerations, each decision maker's knowledge about customer preferences was assessed through a series of questions that they answered immediately after they had made decisions but before they had seen the performance outcomes. They marked the location of various customer segments' ideal points on a perceptual map, and they indicated the relative importance of each customer segment for their firm strategy and operations by dividing 100 points among the existing segments. The accuracy of their knowledge was judged by the Euclidean distance between the points they specified on the map and the objective ideal points for each customer segment (provided by the simulation), weighted by segment importance as reported by each decision maker I incorporated segment importance to give more weight to accuracy (or inaccuracy) in knowledge for segments that are more important to the firm's operations Thus, I measured customer knowledge as follows

$$(2)\qquad \mathrm{CUSTK}_t = \left\{1/\sum_{k=1}^{5} S_{kt}\sqrt{\left[(P_{att1,t} - IP_{1,t})^2_k + (P_{att2,t} - IP_{2,t})^2_k\right]}\right\},$$

where k (= 1, , 5) denotes segment, $P_{att1,t}$ and $P_{att2,t}$ denote decision makers' perceptions of the ideal values of the two most important product attributes for each segment at time t, $IP_{1,t}$ and $IP_{2,t}$ denote the objective ideal values of the two most important product attributes for each segment at time t, and $S_{k,t}$ is the importance of each segment k as indicated by the decision maker at time t

I assessed knowledge about competition by asking each decision maker at each point in time t (each decision period) to list the names of all competing products in each segment and to identify the most influential competitor in each segment I employed two measures of knowledge about competition First, consistent with prior research on competitive monitoring (Clark and Montgomery 1999), I focused on the number of competitors identified and defined competitor knowledge as COMPK_t = (number of competitors identified at time t)/(total number of actual competitors at time t)[2] Second, to account for strength or intensity of competition, I weighted each identified competing product by its distance in perceptual space from the ideal point of the segment designated by the decision maker at time t and by its importance, $S_{k,t}$ For each decision maker,

$$(3)\quad \mathrm{COMPK2}_t = \sum_{k=1}^{5}\sum_{j=1}^{m}\left\{D_{kjt}/S_{kt}\sqrt{\left[(CP_{att1,jt} - IP_{1,t})^2_k + (CP_{att2,jt} - IP_{2,t})^2_k\right]}\right\},$$

where k (= 1, , 5) denotes segment, j (= 1, , m) denotes product, D is a dummy variable that equals 1 if the decision maker has identified product j as a competitor in segment k at time t and equals 0 otherwise, $IP_{1,t}$ and $IP_{2,t}$ denote the objective segment ideal values of the two most important product attributes for each segment at time t, $CP_{att1,t}$ and $CP_{att2,t}$ denote the product's position in perceptual space on the basis of the two most important product attributes at time t, and S_{kt} is the importance of each segment k as indicated by the decision maker at time t Analyses with both measures produced the same pattern of results Finally, I computed the average value of CUSTK and COMPK (COMPK2) across decision makers in each firm to represent, respectively, level of knowledge of customers and level of knowledge of competitors in each firm[3]

To validate these measures further, I estimated a panel model with market knowledge (at the level of the individual decision maker) as the dependent variable, individual as fixed (random) effect, time as fixed (random) effect (or accounted for as an autocorrelation effect, ρ = 36), and variables expected to affect market knowledge as independent variables The results indicate that all variables are significant in the hypothesized direction and jointly explain 29% of the variance, whereas the individual effects explain 18% of the variance In addition, within the same analysis framework, I tested the effects of involvement (measured as the percentage of effort or time respondents spent on analyzing information and preparing for decisions on their own) and found that it did not have a significant effect on market knowledge (parameter = 014, *p* < 78) I also examined whether differences in knowledge within a team and across team members were a result of task assignment The average delegation of tasks within teams was 11 06% of all tasks, which accounts for 1 8% of the variance compared with between-group effects, which account for 10% of the variance This suggests that differences in market knowledge across team members are not just a consequence of the assigned tasks within teams, nor does the amount of delegated effort fully explain the "between" team effects

Change in knowledge Given the assessment of decision makers' knowledge every period, I measured individual change in knowledge about customer preferences (CUSTC) and about competition (COMPC) as $|\partial \mathrm{CUSTK}_t/\partial t|$ and $|\partial \mathrm{COMP}_t/\partial t|$, respectively, and accounted for the rate of change in the different market segments In the analysis, the average value of CUSTC and COMPC across strategic decision makers in each firm represented change in customer knowledge and change in competitor knowledge, respectively

Shared knowledge Consistent with standard measures of diversity across respondents, I measured the extent of shared knowledge about customer preferences (CUSTS) as the variation in CUSTK across decision makers in each firm Specifically, I computed CUSTS as $1/\sigma_{\mathrm{CUSTK},t}$, where $\sigma_{\mathrm{CUSTK},t}$ denotes the standard deviation in the level of customer knowledge across decision makers at time t I measured the extent of shared knowledge about competition (COMPS) in two ways, both of which were consistent with the two measures of competitor knowledge First, I mea-

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[2] Although the ability to assess correctly the strength of competitors is an important aspect of competitor knowledge, attempts to collect data on the most influential competitor per segment yielded many missing data points and inaccuracies in recording (the demand on participants was significant) Respondents often forgot to circle the most influential competitor or, in assigning competing products to segments, noted that they were not sure in which segment the particular competitor's presence was the strongest Because of the significant noise in the data, I chose not to include this measure in the analysis

[3] I also analyzed the data after weighing each team member's knowledge by distance from the team mean This did not change the obtained substantive insights

sured shared competitor knowledge as the extent of variation in COMPK (number of competitors identified), computed as $1/\sigma_{COMPK,t}$, where $\sigma_{COMPK,t}$ denotes the standard deviation in knowledge level of competitors across decision makers at time t Second, I measured shared competitor knowledge per Equation 3 by including only competing products j that all decision makers in the team identified as competitors in a particular market segment

Strategic orientation In line with prior research (Gatignon and Xuereb 1997), each decision maker was asked to allocate 100 points to the following three categories to reflect the categories' relative importance for each time period's investment decisions competition, consumer preferences, and nature of products I measured the strategic orientation of the firm at time t as the average difference in the importance of the customer and competition (Day and Nedungadi 1994) Thus, positive values for this measure indicate greater emphasis on customers than on competitors, whereas negative values reveal a greater emphasis on competitors than on customers

Total shared market knowledge Following guidelines in prior research (Day and Nedungadi 1994), I measured total shared market knowledge as $1/\sigma_{ORIENT,t}$, where $\sigma_{ORIENT,t}$ is the standard deviation of the firm's strategic orientation at time t, such that small values of σ_{ORIENT} indicate a greater extent of total shared market knowledge An alternative measure could be based on a combination of the measures of customer and competitor knowledge The advantages of the measure I used are that it does not assume that there is a particular rule for combining customer and competitor knowledge, and it is an index of overall shared market knowledge, including but not limited to knowledge about customers and competitors According to prior research (Day and Nedungadi 1994), the extent of overlap in decision makers' mental representation of their firm's strategic orientation reflects the extent of the decision makers' shared market knowledge

Satisfaction with past performance I assessed individual decision makers' satisfaction with past performance (SAT) after each period's decisions using a seven-point Likert scale, anchored by "strongly agree" and "strongly disagree" The statements that participants rated were "I was satisfied with my team's performance" and "My team did not do as well as I thought it would" The two measures were highly correlated (734, $p <$ 0001), thus, I averaged scores across decision makers in a firm to represent satisfaction with past performance in that firm

Firm size There are many ways to measure firm size, including by number of employees, financial resources, net sales, or total expenditures (e g , Chandy and Tellis 2000) Given the nature of this study's quasi-experimental setting and processes of interest, number of employees and net sales are not appropriate measures (see Clark and Montgomery 1999) Thus, consistent with the resource-advantage perspective, I measured firm size (SIZE) as the total financial resources (in dollars) available to each firm at each point in time t (No loans were permitted in the simulation) In the model of performance, following the lead of Clark and Montgomery (1999), I used total marketing expenditures as an alternative measure of firm size The advantage of this measure is that it also controls for marketing-mix expenditures, which have been shown to drive performance However, the pattern of results remained the same across the two measures of firm size Therefore, I report results from the first measure

Innovation effort I measured innovation effort (INNOV) in two ways by the dollar amount of each team's investment in product R&D and by the ratio of dollar investment in product R&D to total marketing expenditures (including advertising and sales force activity) The first measure captures the level of innovation effort, and the second captures its intensity Because the two measures were highly correlated (r = 92, $p <$ 0001) and analyses with both produced the same pattern of results, I report results from the first method

Performance I measured performance (PERF) in two ways by the firm's market share, in units sold, at each point in time and by the firm's stock price index In the context of Markstrat, the firm's stock price index is the most comprehensive measure of firm performance (Larreche and Gatignon 1999) In the context of this study, as with prior studies that used Markstrat, a significant correlation exists between unit market share and net marketing contribution (r = 82, $p <$ 001) Descriptive statistics for all variables in the analysis appear in Table 1

Analysis Framework

I specify the following framework for estimating the impact of market knowledge diffusion (i and t denote firm and time, respectively)

$$(4)\qquad \text{INNOV}_{it} = \mathbf{X}_{it}\beta + \varepsilon_{it},$$

$$(5)\qquad \varepsilon_{it} = \rho_i\varepsilon_{it-1} + \eta_{it},$$

$$(6)\qquad \rho_i = \rho + \lambda_i, \text{ and}$$

$$(7)\qquad \text{cov}(\varepsilon_{it}, \varepsilon_{jt}) = \sigma_{ij},$$

where **X** captures the independent variables that are hypothesized to affect the innovation effort (see H_1–H_5),[4] η is an error term, and $\text{var}(\varepsilon_{it}) = \sigma^2_{it}$ Furthermore, ρ_i captures the extent of unique inertial tendency in innovation for firm i Large variation in ρ_i (i e , in λ_i) can be treated as evidence that firms are heterogeneous in their inertial tendency in innovation effort In turn, σ_{ij} in Equation 7 captures the interdependence of the innovation effort of firm i and firm j (Note that $\sigma_{ij}/\sqrt{[\sigma^2_{it} \times \sigma^2_{jt}]}$ is bounded by –1 and +1 and is a correlation coefficient) Notably, Equations 4–7 imply the following structure for innovation effort

$$(8)\qquad \text{INNOV}_{it} = \mathbf{X}_{it}\beta + \rho_i(\text{INNOV}_{i,t-1} - \mathbf{X}_{i,t-1}\beta) + \eta_{it}$$

Thus, after accounting for innovation interdependence across competitors, each firm's innovation effort at every point in time is influenced by current levels of the **X** vari-

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[4] On the basis of H_1–H_5, I specified **X** as **X** = [CUSTK, CUSTK × CUSTC, CUSTK × CUSTS, CUSTK × CUSTC × CUSTS, COMPK, COMPK × COMPC, COMPK × COMPS, COMPK × COMPC × COMPS, SAT, SAT^2, SIZE]

TABLE 1
Descriptive Statistics for Variables in the Study

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Innovation effort	1 00												
2 Customer knowledge level	– 30	1 00											
3 Change in customer knowledge	12	– 17	1 00										
4 Shared customer knowledge	30	28	– 12	1 00									
5 Competitor knowledge level	– 06	32	33	31	1 00								
6 Change in competitor knowledge	17	– 02	37	– 01	27	1 00							
7 Shared competitor knowledge	22	– 24	27	– 21	20	33	1 00						
8 Satisfaction	– 17	33	– 19	36	– 13	– 15	– 30	1 00					
9 Strategic orientation	16	– 03	– 22	02	– 21	01	– 05	40	1 00				
10 Total shared market knowledge	– 17	12	– 06	01	15	10	04	05	– 20	1 00			
11 Firm size	04	30	– 15	22	03	– 15	– 34	41	21	– 18	1 00		
12 Market share	– 03	23	– 14	28	– 15	– 10	– 30	65	46	– 11	57	1 00	
13 Stock price index	01	14	– 17	13	– 13	– 12	– 30	53	39	– 23	68	92	1 00
Mean	613	25	63	16	32	13	16	4 42	14 57	59	12,463	16 66	1324
Standard deviation	859	18	47	15	13	10	10	1 50	13 44	32	4366	8 19	638

Notes Means for firm size and innovation effort are reported in thousands of dollars ables and by the extent of unique inertial tendency in its innovation effort, beyond that explained by previous levels of **X**

Depending on restrictions placed on the model parameters in Equations 4–7, models that correspond to different perspectives can be obtained, these are summarized in Table 2 To estimate the models, I employed a feasible generalized least squares procedure (Greene 2002) [5] I began with the simplest model, $M_{00,}$ and proceeded systematically to free parameters until I obtained the hypothesized Model M_{12} To assess model fit, I performed model comparison tests at each stage of the estimation A comparison of Model M_{11} with M_{12} (and M_{01} with M_{02}), which I accomplished using $\chi^2_{(i \text{ degrees of freedom } [d\,f\,])}$, tests for the presence of unique inertial tendency in innovation effort A comparison of Model M_{02} with M_{12} (and M_{01} with M_{11}), which I accomplished using $\chi^2_{[i(i-1)/2 \text{ d f }]}$, tests for the presence of interdependence in innovation effort across competitors I used the same approach to estimate the model of firm performance presented in Equation 1 [6]

Results

Market Knowledge Diffusion and Innovation Effort

Competitive interdependence and inertia Model M_{01} (see Table 2) is not superior to model M_{00} (ρ = 236, χ^2_1 = 41, not significant [n s]) Furthermore, Model M_{10} is superior to model M_{00} (χ^2_{15} = 54 93, $p <$ 0001) Finally, a comparison of Models M_{10} and M_{12} reveals that the best-fitting model is M_{12} (χ^2_5 = 9 80, $p <$ 05, values of ρ across firms were 364, – 047, 307, 990, – 192, and – 006) This indicates that firms exhibit a unique inertial tendency in innovation effort and that in accordance with the cyclical model of market evolution, there is significant heterogeneity in the interdependence of innovation effort across firms Further analyses are based on Model M_{12}

Table 3 shows all the parameter estimates of Model M_{12} that I used to test specific hypotheses regarding the effects of customer and competitor knowledge, change in knowledge, shared knowledge, and satisfaction on innovation effort Because of the significant interactions in the model, I computed the net effect of the key variables at different levels of the other independent variables, and I report the results in Table 4, in each case, I used the Wald test to test significance (Greene 2002)

Effects of customer and competitor knowledge Table 3 shows a significant interaction among shared knowledge, change in knowledge, and knowledge level The net effect of each aspect of knowledge diffusion, which provides support for H_1–H_4, is shown in Table 4

Effects of shared knowledge Overall, Panel A of Table 4 reveals that across knowledge levels and magnitude of knowledge change, increases in shared knowledge about customers and competitors enhance innovation effort, which provides strong support for H_3 For example, for low customer knowledge and high knowledge change, the greater the shared knowledge, the greater is the innovation effort (net effect = 2 936, $p <$ 001) [7]

Effects of change in knowledge For customer knowledge (Panel B), increases in knowledge change enhance innovation effort when shared knowledge is high At low levels of shared knowledge, a change in knowledge has no effect on innovation effort across different knowledge levels For competitor knowledge (Panel B), increases in knowledge change enhance innovation effort across different levels of knowledge and shared knowledge However, these effects are weaker for low levels of shared knowledge For example, at low levels of competitor knowledge and high levels of shared knowledge, the net effect of knowledge change is 1 131 ($p <$ 05) [8] In contrast, when shared

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[5] If the variance–covariance matrix of the disturbance term is a positive, definite matrix with unknown parameters that need to be estimated (e g , cross-firm correlations, autocorrelations), generalized least squares is not feasible Thus, a structure needs to be imposed on the model (i e , obtain estimates of the unknown parameters and then proceed with the generalized least squares estimation) The resultant feasible generalized least squares estimates are consistent, unbiased, and asymptotically efficient

[6] I did not estimate a simultaneous system of equations because innovation takes place (and is measured) before subsequent performance, which is an important aspect of the study's longitudinal design Empirically, correlation of the residuals from the two models (which account for contemporaneous effects and dependence on the past) is not significant (– 006, $p <$ 588)

[7] The effect of shared customer knowledge on innovation effort is given by b_3CUSTK + b_4CUSTK × CUSTC I evaluated this at low (tenth percentile) and high (ninetieth percentile) values of CUSTK and CUSTC Likewise, the effect of shared competitor knowledge on innovation effort is given by b_7COMPK + b_8COMPK × COMPC I also evaluated this at low (tenth percentile) and high (ninetieth percentile) values of COMPK and COMPC

[8] The effect of change in customer knowledge on innovation effort is given by b_2CUSTK + b_4CUSTK × CUSTS I evaluated this at low (tenth percentile) and high (ninetieth percentile) values of CUSTK and CUSTS The effect of change in competitor knowledge on innovation effort is given by b_6COMPK + b_8COMPK × COMPS, which I also evaluated at low and high values of COMPK and COMPS

TABLE 2
Nested Models of Innovation Effort

Assumption About Interdependence of Innovation Effort Across Firms	Assumption About Inertia in Innovation Effort		
	No Inertia ($\rho_i = 0 \; \forall \; i$)	Similar Inertial Tendency Across Firms ($\lambda_i = 0 \; \forall \; i$)	Unique Inertial Tendency for Each Firm ($\rho_i = \rho + \lambda_i$)
No interdependence ($\sigma_{ij} = 0 \; \forall \; i, j$)	M_{00}	M_{01}	M_{02}
Interdependence (σ_{ij} free)	M_{10}	M_{11}	M_{12}

TABLE 3
The Effects of Hypothesized Variables on Innovation Effort

Conceptual Focus	Variables (Parameter)	Estimate (Standard Error)
Customer knowledge diffusion	CUSTK (β_1)	– 952** (437)
	CUSTK × CUSTC (β_2)	– 229 (366)
	CUSTK × CUSTS (β_3)	1 196*** (306)
	CUSTK × CUSTC × CUSTS (β_4)	3 072*** (370)
Competitor knowledge diffusion	COMPK (β_5)	– 569 (316)
	COMPK × COMPC (β_6)	315 (749)
	COMPK × COMPS (β_7)	552* (316)
	COMPK × COMPC × COMPS (β_8)	3 664** (1 729)
Feedback from marketplace effect of satisfaction	SAT (β_9)	–11 50*** (1 88)
	SAT × SAT (β_{10})	205*** (029)
Firm size	SIZE (β_{11})	– 883 (1 14)

*$p < 10$
**$p < 05$
***$p < 0001$

knowledge is also low, the net effect of knowledge change is ten times smaller (105, $p < 1$) Thus, I obtain mixed support for H_{2a} and strong support for H_{4b}, which indicates that shared customer and competitor knowledge moderates the impact of knowledge change on innovation

Effects of knowledge level Panel C of Table 4 reveals that increases in the level of customer knowledge enhance innovation effort only when there are high levels of shared knowledge about customers[9] The effect of customer knowledge is not significantly (only directionally) enhanced by the magnitude of knowledge change, which does not support H_{2b} If there is little shared knowledge in the firm, an increase in customer knowledge has no impact on innovation effort I obtained the identical result for competitor knowledge The higher the level of competitor knowledge in the firm, the greater is innovation effort, if and only if shared knowledge about competitors in the decision-making team is high If there is little shared knowledge, an increase in competitor knowledge has no impact on innovation effort In summary, I obtained strong support for H_{4a} An increase in shared knowledge about customers and competitors moderates the impact of market knowledge on innovation effort

Feedback effects satisfaction with past performance I obtained significant main ($b_9 = -11\ 50, p < 0001$) and quadratic ($b_{10} = 205, p < 0001$) effects of satisfaction in support of H_5 (see Table 3) Notably, because of the structure of the dynamic model, the effect of satisfaction is beyond any effects of past performance The overall effect of satisfaction (computed as $b_9SAT + b_{10}SAT^2$) is negative across all levels of satisfaction, which supports the hypothesis that satisfaction with performance is a complacency-producing mechanism that dampens innovation effort The results of computation of the net effect of satisfaction on innovation effort (i e , $\partial INNOV/\partial SAT = b_9 + 2b_{10}SAT$) reveal that at low levels of satisfaction (tenth percentile), the net effect is negative and significant (–4 676, $p < 001$) Thus, if decision makers are dissatisfied with their performance, an increase in their satisfaction hinders innovation effort However, as satisfaction approaches its mean value, increases in satisfaction result in an increase in innovation effort (net effect = 1 445, $p < 001$) I obtained the same effect at high levels of satisfaction as well (net effect = 7 976, $p < 0001$) Although at the mean and high levels of satisfaction, a unit increase in satisfaction leads to an increase in innovation effort, the overall impact on innovation effort is still negative Thus, the quadratic effect of satisfaction indicates that the perceived feedback from the market is most damaging to the innovation effort of firms that exhibit moderate levels of satisfaction Firms that exhibit high or low levels of satisfaction witness a smaller decrease in innovation effort

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[9] The effect of customer knowledge level on innovation effort is given by $b_1 + b_2CUSTC + b_3CUSTS + b_4CUSTK \times CUSTS$ I evaluated this at low (tenth percentile) and high (ninetieth percentile) values of CUSTC and CUSTS The effect of competitor knowledge level on innovation effort is given by $b_5 + b_6COMPC + b_7COMPS + b_8COMPK \times COMPS$, which I also evaluated at low and high values of COMPC and COMPS

TABLE 4
Net Effect of Shared Knowledge, Knowledge Change, and Knowledge Level

A. Net Effect of Shared Customer/Competitor Knowledge

	Change in Customer Knowledge	
	Low	High
Customer Knowledge Level		
Low	724**	2 936**
	(123)	(308)
High	12 31**	49 91**
	(2 088)	(5 229)

	Change in Competitor Knowledge	
	Low	High
Competitor Knowledge Level		
Low	735*	2 274**
	(254)	(598)
High	3 970*	12 28**
	(1 370)	(3 230)

B. Net Effect of Change in Customer/Competitor Knowledge

	Shared Customer Knowledge	
	Low	High
Customer Knowledge Level		
Low	154	4 824**
	(120)	(463)
High	2 621	82 01**
	(2 038)	(7 867)

	Shared Competitor Knowledge	
	Low	High
Competitor Knowledge Level		
Low	105*	1 131*
	(059)	(475)
High	566*	6 105*
	(320)	(2 564)

C. Net Effect of Customer/Competitor Knowledge Level

	Shared Customer Knowledge	
	Low	High
Change in Customer Knowledge		
Low	– 636	6 243**
	(416)	(1 416)
High	058	27 95**
	(465)	(2 817)

	Shared Competitor Knowledge	
	Low	High
Change in Competitor Knowledge		
Low	– 406	1 652*
	(354)	(839)
High	034	6 401**
	(277)	(1 596)

*$p < 05$
**$p < 0001$
Notes All entries are estimates Standard errors are in parentheses

From Innovation Effort to Performance: The Role of Total Shared Market Knowledge

To ensure that the errors in Equation 1 were not autocorrelated, I extracted the residuals after estimating Equation 1 and tested them for the presence of autocorrelation Results indicated that the errors were largely white noise (ρ = 35, χ^2_{1df} = 1 11, n s) An examination of model fit revealed a significant inertial tendency in performance (ρ = 63, $p <$ 0001) but no significant difference in the inertial tendency across firms (χ^2_5 = 3 496, n s), that is, no significant difference in ρ_i and the adjustment rates across firms There was also support for heterogeneity in performance interdependence across firms (χ^2_{15} = 39 12, $p <$ 0001) Overall, the model explains 80% of the variation in performance

Drivers of performance Table 5 contains all the parameter estimates of the retained model Observe in Table 5 that a similar pattern of effects emerges across measures of performance For the purposes of concision, the following discussion focuses only on the results derived from the market share analysis The results indicate that there is no significant main effect of innovation effort on performance (b_1 = 090, n s)[10] However, consistent with H_6, there is a significant interaction between innovation effort and total shared market knowledge (b_2 = 5 438, $p <$ 0001) and between innovation effort and firm size (b_3 = – 231, $p <$ 01) Furthermore, there are significant main effects of firm size (b_4 = 921, $p <$ 0001) and strategic orientation (b_6 = 121, $p <$ 0001), which corroborate prior findings in the literature[11] Last, it appears that total shared market knowledge per se has no direct effect on performance (b_5 = – 590, n s) On the basis of the results, the return on innovation

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[10] To address potential problems with multicollinearity, I created an instrument for innovation effort orthogonal to shared market knowledge, firm size, and strategic orientation

[11] Because size is a function of the previous period's performance, I constructed an instrumental variable estimate for size (based on a two-period lagged value) and performed the Hausman specification test The results suggest that the estimated coefficients are not biased (χ^2_{1df} = 1 78, n s)

TABLE 5
Results: From Innovation Effort to Performance

Variable (Parameter)	Main Study: Performance Measured as Market Share	Main Study: Performance Measured as Stock Price Index	Validation Study 2: Performance Measured as Market Share
Innovation effort (β_1)	090 (1 125)	027** (005)	008 (009)
Innovation effort × shared market knowledge (β_2)	5 438* (866)	017** (003)	048** (015)
Innovation effort × firm size (β_3)	– 231** (082)	– 003** (0004)	– 002** (0003)
Firm size (β_4)	921** (437)	806** (046)	247** (055)
Shared market knowledge (β_5)	– 590 (607)	–1 078** (302)	–2 350** (767)
Strategic orientation (β_6)	121** (022)	093** (009)	044** (008)

*$p <$ 05
**$p <$ 0001
Notes Entries are parameter estimates from the corresponding model Standard errors are in parentheses

(i e , the net effect of innovation effort on performance) can be expressed as follows Return on innovation = ∂PERF/∂INNOV = 090 + 5 438 × shared market knowledge – 231 × firm size

There is strong support for H_6, which indicates that the total shared market knowledge helps translate innovation effort into performance Innovation effort results in positive returns only if it is accompanied by a high level of shared market knowledge among decision makers Innovation effort results in negative rather than positive returns for large firms if total shared market knowledge is low (at the ninetieth and tenth percentiles for firm size and shared knowledge, respectively, ∂PERF/∂INNOV = – 026, $p <$ 001) Notably, small firms do not witness such a negative effect Innovation effort has no influence on performance when the level of total shared market knowledge is low, for example, at the tenth percentile for firm size and shared knowledge, ∂PERF/∂INNOV = – 003, n s Small firms evidence positive returns on their innovation effort when shared market knowledge reaches the fifty-fifth percentile of its distribution (at the tenth and fifty-fifth percentile for firm size and shared knowledge, respectively, ∂PERF/∂INNOV = 08, $p <$ 06), whereas large firms show positive returns only after shared market knowledge is greater than the ninetieth percentile (∂PERF/∂INNOV = 012, $p <$ 06) Furthermore, the results suggest that though large firms enjoy higher performance, this effect becomes weaker as innovation effort increases (observe the negative interaction between firm size and shared market knowledge) This finding implies that larger firms are less efficient in obtaining a return on resources used for innovation Thus, although greater firm size appears to be an advantage in the generation of positive performance returns, it is also an impediment to efficient innovation effort

Validation and assessment of theory I conducted several validation exercises with data from three validation studies to assess the impact of repeated data collection on the generative dynamic system of competition, to attempt to replicate the substantive findings from the performance model, and to test the cross-industry predictive ability of the performance model I then examined the nature of substantive findings that might have emerged had I ignored heterogeneity in competitor interdependence in the area of innovation effort and firm performance

The impact of repeated data collection on the generative mechanism of competition The focus was on validating the two aspects of dynamic competitive markets partial adjustment of performance over time and the interdependence in competitors' performance Consistent with the validation objectives, I focused on models of firm performance without any covariates Table 6 reports the key results Observe in Table 6 that across three different industries at different times and involving different levels of data collection, support for the underlying generative mechanism emerges There is partial adjustment of performance (average and standard deviation of ρs are similar across the three industries), and competitors show significant interdependence in performance In Validation Study 1, there were no periodic intrusions on the simulation to collect data, yet the same baseline process is evident Thus, the collection of periodic data in the main study appears not to have influenced the generative mechanism investigated

Replication of substantive findings Table 5 presents results of the replication of the original study The hypothesized variables show a pattern of effects on performance that is similar to the pattern in the original study, thus replicating the previously reported findings

TABLE 6
Validation Results

Aspects of Study	Main Study	Pretest 1	Validation Study 1	Validation Study 2
Microlevel data collected	Knowledge diffusion, satisfaction with past performance, strategic orientation	Satisfaction with past performance, group dynamics, information use issues	None	Satisfaction with past performance, group dynamics, strategic orientation
Number of firms (teams)	6	5	5	6
Number of time periods	8	6	9	9
Analysis data (number of firm/time periods)	48	30	45	54
Support for the partial adjustment model?	Yes (χ^2_1 = 17 383, p < 0001)	Yes (χ^2_1 = 15 122, p < 0001)	Yes (χ^2_1 = 26 698, p < 0001)	Yes (χ^2_1 = 15 07, p < 0001)
Average value (standard deviation) of ρ	732 (188)	753 (189)	763 (138)	700 (116)
Is there performance interdependence across firms?	Yes (χ^2_{15} = 36 148, p < 01)	Yes (χ^2_{10} = 23 71, p < 01)	Yes (χ^2_{10} = 74 80, p < 01)	Yes (χ^2_{10} = 35 46, p < 01)

Cross-industry predictions I used the estimates of β and ρ from the original study to predict firm performance for the industries in the second and third validation studies I was interested in determining whether I could use the obtained insights to predict performance in a different industry The results of the cross-industry predictions are summarized in Table 7, along with the same-industry predictions I obtained correlations of 64 and 92 between actual and predicted performances in the second and third validation studies, respectively The results provide further evidence of the validity of the hypothesized variables' impact on performance

Impact of ignoring competitor interdependence In terms of innovation effort, failure to account explicitly for interdependence across competitors produces a null effect for interactions that involve customer knowledge, change in customer knowledge, and shared customer knowledge, as well as for interactions that involve competitor knowledge, change in competitor knowledge, and shared competitor knowledge In terms of firm performance, failure to account explicitly for interdependence across competitors produces a null effect for the interaction between innovation effort and total shared market knowledge as well as for the interaction between innovation effort and firm size

Discussion

This article offers a conceptualization and a longitudinal empirical assessment of the dynamic process that governs the translation of knowledge about customers and competitors into innovation effort and performance First, I mapped the mechanism by which three aspects of knowledge (knowledge level, knowledge change, and extent of shared knowledge about customers and competitors) influence innovation effort Second, I uncovered the role of total shared market knowledge and firm size in the translation of innovation effort to performance The proposed model explicitly incorporates critical aspects of the dynamic competitive process, including firm-specific inertial tendency in

TABLE 7
Results of In-Sample and Cross-Industry Prediction

	Hypothesized Model Performance		
Criteria	Main Study	Validation Study 2	Validation Study 3
Correlation between actual and predicted performance	80	64	92
Mean absolute error	2 52	2 40	2 59
Mean absolute percentage error	175	178	22
Mean square error	11 43	9 10	10 19
Theil's U	092	087	071

innovation, heterogeneity in interdependence of innovation across competitors, feedback effects reflected in satisfaction with past performance, and partial adjustment of firm performance over time Results from a longitudinal quasi field experiment and series of validation studies provide strong support for the theory

Limitations

First, although prior studies that have used Markstrat as a research platform have typically collected data at the team level, most of the measures in this study required data from all the team members and over time The use of frequent collection periods placed constraints on the number of participants involved in the study and on the number of variables involved The benefits of conducting longitudinal quasi field experiments were balanced by smaller samples that provided a relatively conservative test of the theory

Second, following Clark and Montgomery (1999), I measured firm size in terms of available financial resources rather than number of employees or net sales (see Chandy and Tellis 2000) Although I replicated the study's results using marketing expenditures as a measure of firm size, the existence of multiple methods to measure firm size warrants attention in further research The use of other measures in different contexts might further clarify the role of firm size in innovation and performance In addition, this study could have benefited from an investigation of additional aspects of market knowledge (e g , it might have explored knowledge about the features of competing products), but this would have added significantly to the already substantial data collection task

Third, I tested the theory in the context of simulated industries As a quasi-experimental setting, Markstrat does not provide the same environment as an actual company The simulated environment made it possible to control for organizational structural factors that might influence the studied relationship, but this required the assumption that the strategic decision-making team drives the strategic course of the organization Thus, the simulation does not address the diffusion of market knowledge throughout the organization However, despite the limitations inherent in the use of a simulation, the following aspects enhanced the validity of the study (1) replication of the baseline generative system of competition at different points in time over two-and-a-half years, involving different levels of data collection in the context of four different industries, (2) replication of the study's substantive findings on firm performance, (3) use of an efficient feasible generalized least squares estimation, which made it possible to obtain consistent estimates of the parameters of interest (Greene 2002), (4) generation of solid cross-industry predictions of firm performance, (5) all the variables included in the analysis having a significant role in the phenomena explored, either as main effects or in interactions involving other variables, though sample size influenced the power of the estimation, and (6) examination of how the collection of periodic individual data might affect the behavior of decision makers, which revealed no evidence that repeated data collection adversely affects the findings Replication of this study in nonsimulated industries would enhance the generalizability of the findings

Fourth, the study did not directly measure decision makers' expectations about their decisions, instead, it measured satisfaction with past performance According to the expectation-disconfirmation theory of satisfaction (e g , Oliver 1980), satisfaction is expected to mediate the effect of prior expectations on strategic decision making According to this perspective, satisfaction with past performance should contain information about expectations associated with the decisions as well as the comparison of the expectations with performance

Fifth, although for maximum benefit shared knowledge should comprise knowledge not only about the market but also about the company, products, financial issues, objectives, strategies, internal capabilities, processes, and so on, this article focuses strictly on shared *market* knowledge It does not address other aspects of shared knowledge in general or differences in perspectives based on functional responsibility

Innovation Effort

This study reveals that three aspects of market knowledge diffusion (market knowledge, change in market knowledge, and shared market knowledge) and their interplay over time shape the extent of innovation effort The results indicate that mere possession of accurate knowledge about customers and competition does not lead to enhanced innovation Instead, change in market knowledge and shared knowledge assume key roles in transforming market knowledge into innovation The results also support prior research conjectures (e g , Chandrashekaran et al 1999) that satisfaction with past performance is an inertia-producing mechanism that suppresses innovation over time The quadratic effect of satisfaction, which shows that firms that exhibit high or low levels of satisfaction demonstrate a smaller decrease in their innovation effort, is perhaps indicative of successful firms' motivation to protect their market power and of poorly performing firms' desire to change their fortune Firms characterized by moderate levels of satisfaction are perhaps plagued by the desire merely to stay afloat, they may avoid changing their behavior because they may be more uncertain about the drivers of market success Thus, moderate levels of satisfaction may be a manifestation of uncertainty about the market, and this uncertainty may result in failure to innovate This constitutes a worthwhile avenue for further research

The results also suggest that innovation effort takes shape over time under the influence of two opposing forces market knowledge diffusion, which propels innovation, and satisfaction with past performance, which hinders it Moreover, in the current study, the opposing forces assumed equal importance in the innovation-generation process, explaining approximately equal amounts of variation in innovation effort Furthermore, the results offer evidence of unique inertial tendency in innovation effort and of interdependence in innovation effort across competitors Failure to control explicitly for such strategic interdependence produces an inferior fit to the data and null effects for the impact of many variables This points to the need for further research to consider these effects when investigating the antecedents of innovation across firms It also raises worthwhile questions for further research For example, how do firms learn about the innovation effort of their competitors, and what are the inference processes at work? What are the factors that determine the extent of inertial tendency in innovation effort and heterogeneity in inertia across firms? Some factors that further research might consider include individual-difference variables, such as decision makers' proneness to inertia or risk taking, and aspects of the decision-making process, such as strategic conjecturing about competitors and customers, beliefs about market dynamism, and effectiveness of implementation Bayus, Erickson, and Jacobson (2003) initiate such an inquiry by examining the number of new products introduced as a potential determinant of inertial patterns in profits across firms in the personal computer industry, but their study finds no effects

Performance

With regard to the relationship among shared market knowledge, innovation, and performance, the results of this study suggest that shared market knowledge helps smaller firms actualize better returns for their innovation effort, which means that shared market knowledge may be a source of competitive advantage for resource-strapped firms Specifically, large firms, which experience inertial effects of their financial resources, need to achieve higher levels of shared market knowledge to enjoy the same positive returns as small firms Strikingly, for small firms in this study at the mean level of shared market knowledge, an increase in innovation effort by $1 million results in a return of 1 3% market share points Large firms experienced almost the same return (1 2% market share points) only at the ninetieth percentile of shared market knowledge Studies across different contexts should be conducted to replicate the results and to identify limiting conditions based on industry factors and dynamics Overall, this model shows that the impact of innovation effort on performance depends on shared market knowledge and firm size Still unknown are the mechanisms that firms can employ to facilitate the efficient and effective sharing of market knowledge Given the cost of attaining shared market knowledge, what are the structural and cognitive impediments to achieving optimal shared knowledge? Are the patterns of inertia in innovation and firm performance also prevalent in the processes by which individual decision makers learn and share knowledge with one another? These are questions worthy of future research endeavors

Conclusion

In a significant departure from prior work, this research adopts a dynamic perspective of the simultaneous evolution of market knowledge and innovation It also contributes to the debate about the role of market knowledge accuracy in strategic decision making Although I used a quasi-experimental setting to test the conceptual model (which requires replications in different industrial settings), the research clarifies the role of market knowledge and suggests that market knowledge, by itself, has no positive effects on innovation effort or performance When market knowledge is updated (i e , changed on the basis of individual interpretation of the market) and shared among decision makers (i e , there is common understanding of the relevant market knowledge in the team), it leads to increased innovation effort and higher returns to innovation Furthermore, the results reveal that though innovation effort is sensitive to shared knowledge about both customers and competitors, it is more sensitive to competitor knowledge than to customer knowledge Although the spectrum of this response no doubt depends on the industry setting, assessment and management of the returns to market knowledge should take into account the dynamic impact of knowledge change and sharing in the strategic decision-making team over time The results also imply that this might be more important for resource-constrained than for financially endowed firms

Finally, this research has built on the momentum created by prior research in the marketing literature on organizational learning, strategic orientation, and organizational memory I hope that it generates further examination of the dynamic processes that underlie market knowledge diffusion and the nature of its consequences for performance over time

Appendix
Firm Performance's Partial Adjustment Process

The partial adjustment process can be expressed as follows (see Coleman 1968, Greve 1999)

(A1) $$\partial PERF_{it}/\partial t = r_i(PERF^*_{it} - PERF_{it}),$$

where $PERF_{it}$ and $PERF^*_{it}$ denote the realized and potential performance for the ith firm at time t, and r_i captures the adjustment rate for the ith firm When $r_i = 0$, there is no adjustment, and a condition of complete inertia is in evidence When r_i is large, there is evidence of little inertia

Solving Equation A1 yields the following solution

(A2) $$\ln\left[\frac{PERF^*_{it} - PERF_{it}}{PERF^*_{i,t-1} - PERF_{i,t-1}}\right] = -r_i,$$

which simplifies to

(A3) $$PERF_{it} = PERF^*_{it} - e^{-r_i}(PERF^*_{i,t-1} - PERF_{i,t-1})$$

Substituting $\rho_i = e^{-r_i}$, I obtain

(A4) $$PERF_{it} = PERF^*_{it} - \rho_i(PERF^*_{i,t-1} - PERF_{i,t-1})$$

Finally, specifying $PERF^*_{it} = \mathbf{X}_{it}\beta + \varepsilon_{it}$, I express the autoregressive partial-adjustment model as follows

(A5) $$PERF_{it} = \mathbf{X}_{it}\beta - \rho_i(\mathbf{X}_{i,t-1}\beta - PERF_{i,t-1}) + \varepsilon_{it} - \rho_i\varepsilon_{i,t-1},$$

which can be expressed as follows

(A6) $$PERF_{it} = \mathbf{X}_{it}\beta - \rho_i(\mathbf{X}_{i,t-1}\beta - PERF_{i,t-1}) + \eta_{it},$$

where $\eta_{it} = \varepsilon_{it} - \rho_i\varepsilon_{i,t-1}$

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Jean L. Johnson, Ravipreet S. Sohi, & Rajdeep Grewal

The Role of Relational Knowledge Stores in Interfirm Partnering

Drawing on the notions of relational capabilities and absorptive capacity, the authors examine the effects of interactional, functional, and environmental knowledge stores on relationship quality and relationship portfolio effectiveness The results suggest that the knowledge stores affect the outcome variables differently and that the effects vary by levels of industry turbulence

Over the past decade, concepts pertaining to knowledge acquisition and development by firms (i e , organizational learning) have assumed an important role in the understanding of how firms succeed A reason for the enthusiastic interest in knowledge acquisition and management could be the close relationship between a firm's knowledge stores and its capabilities or competences (e g , Eisenhardt and Martin 2000, Leonard-Barton 1992, Winter 1987, 2000) Given the widely acclaimed strategic significance of capabilities that derive from a firm's knowledge stores, particularly complex stores that are deeply embedded and difficult to observe or imitate, knowledge can result in competitive advantage and superior performance (e g , Eisenhardt and Martin 2000, Teece, Pisano, and Shuen 1997) Indeed, many firms allocate substantial resources to knowledge development and management For example, General Motors has implemented a companywide learning system that enables adaptation to market conditions The mutual insurance company USAA has designed and implemented a knowledge system that enables the company to manage its strategic initiatives Kraft Foods has created a knowledge system that enables expenditures to be redeployed to high-value activities Ocean Spray has implemented a marketing-knowledge repository that provides marketplace information to managers Finally, Toyota has created a knowledge-sharing network with suppliers to facilitate learning (Dyer and Nobeoka 2000, Slotegraaf 1999) Beyond these, other examples of firm-level learning efforts abound

Recognizing that knowledge is fundamental to building capabilities, scholars have emphasized the role of organizational learning and knowledge management in marketing (e g , Day 1994, 2000, Glazer 1991, Sinkula 1994, Slater and Narver 1995) In terms of empirical work, some researchers have investigated the role of knowledge and learning in new product development processes (Li and Calantone 1998, Madhavan and Grover 1998, Moorman and Miner 1997) Others have examined learning in the context of market information processing (Hult and Ferrell 1997) and indirectly in market and learning orientations (Baker and Sinkula 1999, Hurley and Hult 1998, Sinkula, Baker, and Noordewier 1997) Although learning and knowledge are believed to play a significant role in interfirm relationships (Dyer and Singh 1998), work in this area is limited to a few conceptual articles (e g , Lukas, Hult, and Ferrell 1996, Mohr and Sengupta 2002) The broad objective of this article is to extend this stream of research by empirically examining the role of knowledge stores in buyer–seller interfirm relationships (IRs)

Scholars have suggested that IRs often serve as strategic assets and, as such, firms should try to develop the ability to manage them accordingly (Day 1994, 2000, Dyer and Singh 1998, Jap 1999, 2001, Johnson 1999, Srivastava, Shervani, and Fahey 1998) This vital ability, referred to as a firm's "relational capability" (Dyer and Singh 1998), is based on the creation of knowledge stores (Winter 1987, 2000) Although relational capability is strategically crucial, little is known about how it is developed and used, particularly in the turbulent conditions that typify the business environment that many firms face today Realization of any potential advantage of relational capability requires an understanding of the processes involved in developing the relevant knowledge that underpins it and the use of that knowledge across different environmental conditions

In this article, we suggest that IR knowledge stores develop from a firm's absorptive capacity (Cohen and Levinthal 1990) Furthermore, because the garnering of superior outcomes is a primary impetus for learning and capabilities development, we examine the effects of IR knowledge on relationship outcomes We focus on two such outcomes First, we examine the effects of IR knowledge on relationship quality (e g , Hibbard, Kumar, and Stern 2001) Second, we investigate the impact of knowledge stores on relationship effectiveness across the firm's IR portfolio (Cannon and Perreault 1999) Given that firms often operate in an ever-changing environment, we also investigate the moderating effect of environmental turbulence

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Conceptual Framework

Relational capability involves a firm's learned ways of behaving in its IRs, including procedures and policies in IR management The development and manipulation of knowledge stores is integral to the creation of relational capability (e g , Day 1994, Dyer and Singh 1998, Leonard-Barton 1992) To develop knowledge stores for the socially complex and deeply embedded routines that constitute relational capability, firms actively engage in learning at the organizational level (Collis 1994, Nonaka 1994, Winter 2000) Over the past decade, various perspectives have been presented on organizational learning, including ones that conceptualize learning as the process of gathering, disseminating, and interpreting information (e g , Sinkula 1994, Slater and Narver 1995) These works, which focused on information and its use and integration in the firm, have been particularly useful in learning about markets and market responses (e g , Li and Calantone 1998) A complementary perspective on learning that has received considerable attention in the organizational literature (Lane, Koka, and Pathak 2002), and one that readily lends itself to the explanation of capabilities development, is that of absorptive capacity (Cohen and Levinthal 1990)

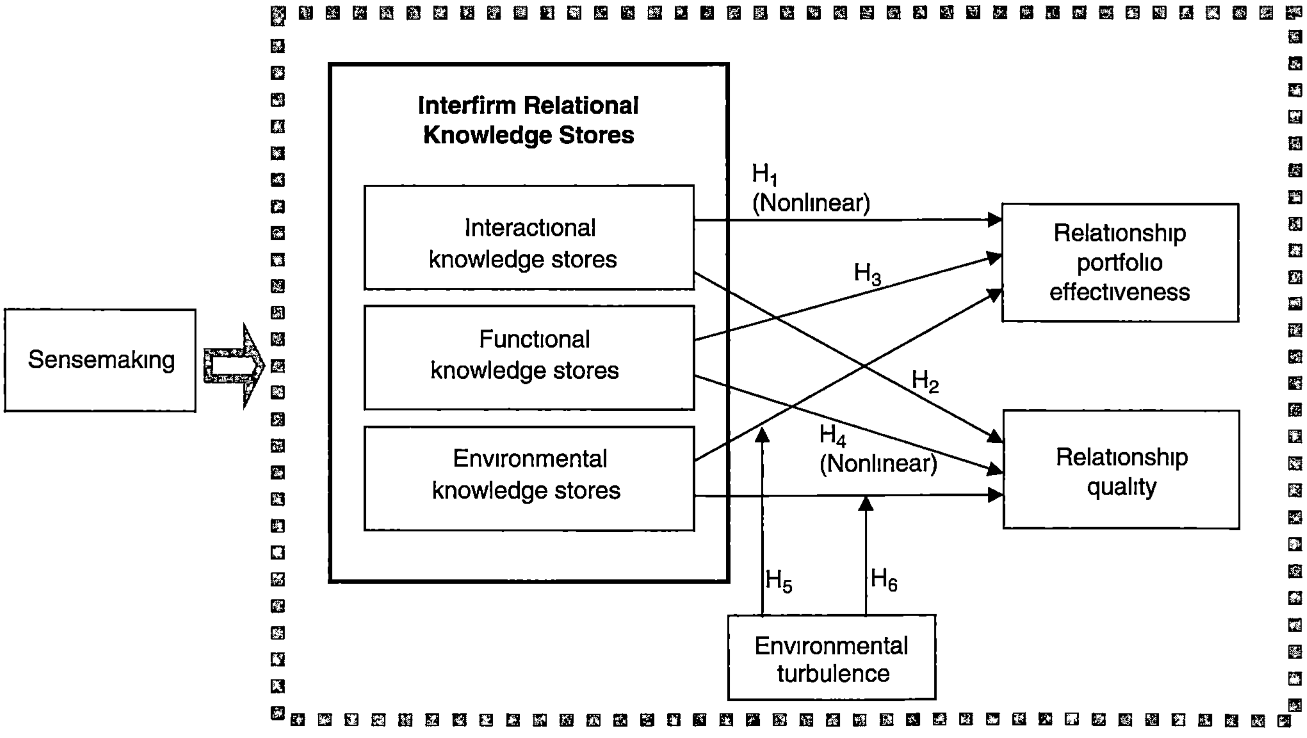
Absorptive capacity depicts learning as the processes by which a firm derives and absorbs knowledge from its experiences and actions (e g , Cohen and Levinthal 1990, Lane and Lubatkin 1998, Zahra and George 2002) At an abstract level, absorptive capacity has been defined as a firm's ability or capability to build and upgrade knowledge stores An important implication of the absorptive capacity perspective is that it assumes that there is some preexisting level of knowledge Absorptive capacity describes how knowledge develops cumulatively and builds on prior knowledge stores (Cohen and Levinthal 1990) Firms that have prior relevant knowledge are better able to acquire and assimilate new knowledge The three central components of absorptive capacity are (1) an understanding of new information based on the accumulation of observations and cues from experiences, (2) assimilation and integration of the information into knowledge stores, and (3) application of the knowledge (Cohen and Levinthal 1990, Lane, Salk, and Lyles 2001)

Absorptive capacity provides the theoretical framework for our conceptual model, which is shown in Figure 1 Firms come to terms with new information and assimilate it into knowledge stores through sensemaking, wherein meaning is assigned to observations and cues in situations, events, and occurrences (Weick 1995) Knowledge emerges from offline or retrospective processing that is involved in sensemaking because it reorganizes and creates order from discrepant observations and cues Here, we focus particularly on the knowledge-application phase of absorptive capacity We expect that when IR knowledge is developed, it can be applied in interfirm relationships to enhance their individual quality and effectiveness as a group

IR Knowledge Stores

Knowledge stores in IRs are a firm's reservoirs of collective insights, beliefs, behavioral routines, procedures, and poli-

FIGURE 1
Model Depicting Conceptual Framework and Hypothesized Relationships


Sensemaking
Interfirm Relational Knowledge Stores
Interactional knowledge stores
Functional knowledge stores
Environmental knowledge stores
H_1 (Nonlinear)
H_3
H_2
H_4 (Nonlinear)
H_5
H_6
Relationship portfolio effectiveness
Relationship quality
Environmental turbulence

cies in IR management (Day 1994, Walsh and Ungson 1991) When firms form strategic relationships with a few suppliers instead of arm's-length transactions with many suppliers (e g , Anderson and Weitz 1992, Celly, Spekman, and Kamauff 1999, Ganesan 1994, Watts, Kim, and Hahn 1992), the role of knowledge related to interactions and relational dynamics becomes extremely important Firms also must manage the functional components in the IR, such as costs, quality, delivery, and inventory aspects in the supply chain Indeed, relationship management and supply chain management have been proposed as core business processes (Lehmann and Jocz 1997, Srivastava, Shervani, and Fahey 1999), which makes knowledge about the processes crucial to company success Prior research also points to the need to study environmental conditions (e g , Achrol, Reve, and Stern 1983) A preponderance of the strategy literature suggests that to be successful, firms need to identify and adapt to the environmental conditions (Moorman and Slotegraaf 1999) Firms' IRs serve as antennas that scan their environments and act as sources of information on various aspects, including the competitive environment (e g , Celly, Spekman, and Kamauff 1999) Firms' IRs also serve as mechanisms for coping with the environment (e g , Achrol and Stern 1988, Dwyer and Welsh 1985), which makes knowledge about the environment another crucial component of IR knowledge stores On the basis of this and exploratory interviews with managers, we consider three important subdomains of IR knowledge in this study (1) interactional knowledge stores, (2) functional knowledge stores, and (3) environmental knowledge stores

Interactional knowledge stores Interactional knowledge stores consist of knowledge about issues related to interactions in partner relationships Interactional knowledge includes aspects such as communication, negotiation, conflict management, and development and implementation of cooperative programs (e g , Ganesan 1993, Heide and John 1990, Mohr, Fisher, and Nevin 1996, Murry and Heide 1998) Interactional knowledge stores reflect the socio-psychological components of IRs

Functional knowledge stores Functional knowledge stores consist of a firm's knowledge about issues related to the management of supply chain functions Functional knowledge includes working with suppliers in areas such as cost reduction, quality control, operations and production, logistics and delivery, inventory management, and product development (e g , Frazier, Spekman, and O'Neal 1988, Klein, Frazier, and Roth 1990, Srivastava, Shervani, and Fahey 1999)

Environmental knowledge stores Environmental knowledge stores consist of a firm's knowledge about its external operating environment Environmental knowledge stores include factors in the secondary and macro task environments, such as competitive behavior, market conditions, and variations in laws and regulations (e g , Achrol and Stern 1988, Dwyer and Welsh 1985, Grewal and Dharwadkar 2002)

Hypotheses

In this study, we examine the effects of each IR knowledge store on two forms of strategically desirable relational outcomes First, we consider the effect of IR knowledge on relationship quality, which is a higher-order construct composed of three dimensions trust, commitment, and stability (e g , Hibbard, Kumar, and Stern 2001, Jap 1999) Second, we consider the influence of IR knowledge on the effectiveness of a firm's IR portfolio Despite their advantages, not all IRs can or should be close and collaborative (e g , Cannon and Perreault 1999, Frazier 1999), certain relationships simply may not merit the resources required to maintain them, "partner" firms may prefer arm's-length arrangements, or transaction characteristics may make market governance more effective (e g , Williamson 1996) Thus, outcomes of IR knowledge extend beyond individual IRs to include portfolio perspectives in which IR effectiveness is considered as a group We expect that the various dimensions of IR knowledge (interactional, functional, and environmental) influence the two outcomes in complex ways

Effects of Interactional Knowledge Stores

A firm's portfolio of relationships may vary from arm's-length, transaction-based arrangements to close, collaborative partnerships (Cannon and Perreault 1999, Frazier 1999) Given the extent to which interactional issues (e g , planning and managing partnering activities, negotiating, managing conflict) pervade and extend over the range of a firm's IRs, knowledge gained in any one IR may be applied to others Because of these transferability and knowledge spillover effects (Uzzi and Gillespie 2002), interactional stores should increase the effectiveness of a firm's relationship portfolio Furthermore, we expect that this increase is nonlinear because interactional knowledge stores can potentially generate positive feedback effects with respect to portfoliowide effectiveness, which should manifest in the accrual of returns at an increasing rate Positive feedback effects are self-reinforcing mechanisms that enhance outcomes through learning, coordination, and/or scale effects (Arthur 1994, Dickson, Farris, and Verbeke 2001) For example, a firm with strong negotiation skills can apply the skills in all negotiating activities across its relationship portfolio for significant payoffs in multiple relationships Thus, we suggest the following

> H_1 The effect of interactional knowledge stores on the general effectiveness of IRs is positive and nonlinear, greater levels of interactional knowledge stores increase the effectiveness of the IR portfolio at an increasing rate

Interactional knowledge stores are instrumental in the identification and facilitation of the development of behaviors and properties that are desirable in close, partner-style IRs (e g , Ford and McDowell 1999, Morgan and Hunt 1994) Interactional knowledge—such as that involved in negotiating with suppliers, planning and managing IR activities, implementing cooperative programs, and managing conflict—can be key in building trust and commitment in a relationship (Crosby, Evans, and Cowles 1990, Morgan and Hunt 1994, Stern, Sternthal, and Craig 1973, Sullivan et al 1981) Firms can also use effective interactional knowledge to build strong bonds with a partner, thereby providing stability to a relationship (e g , Anderson and Weitz 1992) However, because trust, commitment, and stability are idiosyncratic to each relationship, the transference and feedback effects of interactional knowledge are limited and nonmultiplicative Therefore

> H_2 The level of interactional knowledge stores positively influences relationship quality

Effects of Functional Knowledge Stores

Firms garner functional knowledge stores by investing in a relationship through programs and activities such as total quality management (TQM), just-in-time (JIT) systems, or product codevelopment In the process, a firm develops a deep understanding of its partner's (e g , its supplier's) way of doing business, of its resources and objectives, and of the supplier firm in general In this respect, it is not practical or even desirable to invest in and develop such deep understanding for all suppliers Even when TQM, JIT, or other similar programs are desirable for a supplier, some adaptation of the program is needed to accommodate the uniqueness from supplier to supplier Thus, because of the unique properties of the functional knowledge stores, and because of the type of relationships in which these stores develop and come into play, they are somewhat more limited in their generalizability than are the other IR knowledge stores

Despite this, some expertise and skill can be reasonably applied across the firm's portfolio of relationships, because in developing rich functional knowledge stores, a firm has a greater understanding of what can and should be accomplished throughout its IR portfolio in terms of functions and cost reduction With rich functional knowledge stores in place, the firm has a platform from which it can effectively adapt and extend its knowledge For example, developing effective interfirm TQM programs with a supplier provides the firm with a point from which to develop TQM programs with others, even though the programs may not be the same Thus, we expect the following

> H_3 The level of functional knowledge stores positively influences the overall effectiveness of the IR portfolio

Functional knowledge stores imply that a buyer builds knowledge from working closely with individual suppliers in areas such as cost reduction, new product development, and quality improvements and from integrating a supplier in the buyer's JIT and extranet systems A firm's building of this knowledge store mandates resource utilization in order to understand its partner's objectives, needs, and ways of doing business As a result, the knowledge accumulated is often proprietary and, relative to the other components of IR knowledge, specific to that partner firm However, when functional knowledge stores have been acquired, they enable a firm to leverage facets of the supply chain and to provide increased returns for the partner (Srivastava, Shervani, and Fahey 1999), thereby enhancing the quality of the relationship between the firms For example, a firm may invest in developing a TQM program with a partner firm When the program is in place, the benefits accrue continually, which further strengthens the relationship between the firms (e g , Douglas and Judge 2001, Flynn, Sakakibara, and Schroeder 1995) and enhances relationship quality at an increasing rate Thus, positive feedback effects due to localized learning are set in motion (Dickson, Farris, and Verbeke 2001) Therefore, we hypothesize the following

> H_4 The effect of functional knowledge stores on relationship quality is positive and nonlinear, greater levels of functional knowledge stores increase relationship quality at an increasing rate

Effects of Environmental Knowledge Stores

It is important for firms to manage the uncertainty that stems from the environment (Achrol, Reve, and Stern 1983, Achrol and Stern 1988, Dwyer and Welsh 1985) Environmental knowledge stores help a firm recognize environmental contingencies and develop its IR portfolio to manage them (e g , Cannon and Perreault 1999) Based on the environmental conditions, these knowledge stores enable a firm to recognize and assemble an array of relationships, some of which provide flexibility and ease of dissolution when needed and others that provide the advantages of close, partner-style IRs Consistent with the open-systems perspective (e g , Achrol, Reve, and Stern 1983), these knowledge stores are geared toward helping firms manage their environment by configuring the optimal IR portfolio However, the effectiveness of these knowledge stores depends on the degree of environmental turbulence In stable environments, organizations are less likely to change their patterns of behavior (Mintzberg and Waters 1985) However, in turbulent environments, previous patterns of behavior are less informative, and firms must draw on their environmental knowledge stores to guide their actions with respect to reconfiguring and managing the IR portfolio Thus, an increase in environmental turbulence enhances the positive effect of environmental knowledge stores on IR portfolio effectiveness, which suggests an interaction effect

> H_5 Environmental turbulence moderates the effect of environmental knowledge stores on the overall effectiveness of the IR portfolio, the positive effect strengthens as environmental turbulence increases

Scholars have argued that individual IRs provide buffers and are an effective means for firms to cope with environmental uncertainty (e g , Achrol 1991) In the context of buyer–seller interactions, when environmental conditions vary, firms tend to develop closer relationships with partner firms because close relationships create flexibility, which enables the dyadic partners to adapt and negotiate adjustments mutually (Noordewier, John, and Nevin 1990) Furthermore, when environmental demands and practices are constantly changing, close relationships facilitate communication and coordination across the dyad (Jap 1999) Sometimes, firms also establish close relations with supplier firms, especially in international markets, to create supply stability and to have access to the resources they need (Keister 1999) Environmental knowledge stores facilitate the creation of close relationships because they enable a firm to recognize and communicate environmental contingencies to partners Thus, we expect that environmental knowledge stores positively affect relationship quality, but the effect depends on the degree of environmental turbulence When the environment is stable, firms have little need to draw on these knowledge stores However, in turbulent environments, the need and value of the knowledge stores increase Thus, we posit the following

H_6 Environmental turbulence moderates the effect of environmental knowledge stores on relationship quality, the positive effect strengthens as environmental turbulence increases

Methods

Questionnaire Development and Pretesting

We based the measures developed for this study on the academic and practitioner literature and on field interviews These sources provided the foundation for construct item pools, which were subjected to several iterations of peer review by experts in the field After a satisfactory conclusion on the item pools, the completed research instrument was again peer reviewed with format, appearance, and flow as the major focus Next, we pretested the questionnaire through in-depth interviews with executives from four firms In the interviews, we discussed the study objectives in general terms, after the pretest, subjects completed the questionnaire, and we debriefed them extensively This pretesting approach was appropriate first because concerns regarding the sample size that, in general, are assessed through broader-based pretesting were addressed in our study by the extensive key-informant prescreening procedure we used Second, given that several constructs in our study are new, we believed that we could isolate measurement and questionnaire format problems more effectively with in-depth interviews

An important third concern in pretesting involved the transition between reporting tasks Some elements of the questionnaire focused on a firm's supplier relationships in general, and other elements focused on a specific supplier relationship To address this, we separated the two reporting tasks in the questionnaire As a task-transition mechanism, a distinct section of the questionnaire focused attention on an individual relationship by asking respondents to identify a specific relationship and to report demographic and descriptive information on that relationship Pretesting ascertained that the respondents indeed made the transition from general interfirm partnering tendencies to a specific supplier relationship without confusion Our transition mechanism to change respondent focus was effective In addition, all respondents completed the questionnaire in the expected amount of time and understood the instructions, reporting tasks, items, and language we used

Sample and Data Collection Procedures

We collected data from a multi-industry mail survey that included the chemical and allied products, rubber and plastic products, metal fabrications and products, industrial machinery and equipment, electronic and electric equipment, and automotive and transportation equipment industries As a preliminary step in the research process, we conducted several in-depth telephone and personal interviews with materials-acquisition executives in the industries The results of the interviews implied that the research topic was relevant and compelling for the incumbent firms In addition, the interviews suggested that the construct variance would likely be sufficient for testing the posited relationships

We procured a list of firms from a commercial list source After removing duplicate and incomplete addresses from the list, we had a sample of 781 firms for the project The first step in data collection was a mail prescreening of potential respondents to assess their appropriateness and to determine whether they met the criteria of involvement and knowledgeability, as indicated by Campbell (1955) Using a short prescreening questionnaire, we determined their position with the firm, number of years in that position, and percentage of time spent on supplier-related activities In addition, using seven-point scales, we assessed (1) the extent to which respondents were personally involved in supplier relationships and (2) how knowledgeable they were about their firm's dealings with suppliers Of the 781 firms, we received prescreening responses from 330 Of these, we eliminated 11 because they were low on the knowledgeability and involvement criteria (i e , scored lower than six on a seven-point scale), spent less than 70% of their time on supplier-related activities, were in their position less than two years, or were low-level purchasing personnel The 319 remaining managers identified as appropriate key informants held titles including vice president or directors of operations, procurement, manufacturing, materials management, or supply processing

Each of the 319 qualified potential respondents was mailed a packet that included a cover letter, the survey instrument, and a prepaid return envelope As an incentive for participation in the study, we offered the respondents an executive summary To overcome a possible selection bias of managers automatically reporting on the largest supplier, we used a 2 × 2 design and randomly assigned respondents to report on the following aspects of a supplier relationship relationship duration of less than two years versus greater than two years and average versus crucially important components or products supplied in the relationship Assignment to one of the four conditions resulted in reports on a diverse range of relationships for study (Ganesan 1994) As a cross-check for key informant validity, we also included the items we used for prescreening in the survey instrument The initial mailing and one follow-up mailing generated 176 responses (23% of the original sample and 55% of the qualified informants), of which 169 were usable To check for nonresponse bias, we compared the respondents with nonrespondents on the prescreening questions, Standard Industrial Classification (SIC) codes, company sales volume, and number of employees We then compared the early and the late respondents on demographic and model variables (Armstrong and Overton 1977) The t-tests showed no statistically significant differences, which suggests that response bias was not an issue in this study

Measures

We used formative scales to assess the interfirm relational knowledge stores The measures focused on the managers' perceptions of the content and level of IR partnering knowledge retained in the firm's memory (e g , Moorman and

Miner 1997) The responding executives rated the extent of knowledge that they believed their firms held, using a seven-point Likert scale anchored by 1 = "very little knowledge" and 7 = "extensive knowledge " The measure of interactional knowledge stores consisted of five items that pertained to negotiating practices, planning and management of partnering activities, development and use of cooperative activities, computer networking with suppliers, and conflict management We assessed functional knowledge stores with six items that consisted of cost reduction, product development, delivery time, quality management, inventory management, and production efficiency For environmental knowledge stores, four items pertaining to laws and regulations, market conditions, labor conditions, and competitors' behaviors constituted the measure The Appendix provides full detail on the measures in the study

Relationship quality consisted of three dimensions trust, commitment, and stability The measure of trust consisted of six items that focused on, for example, partner honesty, reliability, and partner concern for the firm's welfare (Doney and Cannon 1997) We assessed commitment with a five-item scale that included issues such as loyalty, willingness to invest, and expectations of a long-term association (Anderson and Weitz 1992) For the trust and commitment measures, the responses ranged from 1 = "strongly disagree" to 7 = "strongly agree " We created a four-item bipolar adjective scale to assess relationship stability For example, executives rated the extent to which their supplier relationship was insecure or secure on a seven-point scale

The measure for relationship portfolio effectiveness, which we also created for this study, focused on perceptions about the firm's IRs as a group Four statements constituted the scale An example of the statements is, "Across the board, our supplier relationships operate well for us " Other items assessed productivity, efficiency and effectiveness, and the extent to which the IRs met the firm's needs as a group or portfolio Executives responded in terms of whether they agreed or disagreed with the statements on a seven-point scale

We based the environmental turbulence measure on secondary data We used trade literature, government documents, and popular business press (e g , *The Wall Street Journal*, *BusinessWeek*) to gather information on technological change, innovation, significant new product introduction, growth or decline in markets, competitive and industry structure changes (e g , mergers, acquisitions, alliances, number of firms leaving or entering, changes in market shares or concentration ratios), legal or regulatory changes, and other factors that we judged as part of the relevant environment On the basis of the information, we used a Delphi-like iterating approach to develop the scale using the following procedure (1) A team of MBA students compiled environmental turbulence reports for each industry, (2) the reports were shared across the six industry teams, (3) using a scale that ranged from one (least turbulent) to six (most turbulent), each team evaluated the turbulence level for each industry, (4) the teams paired up to reevaluate and reconcile their ratings, (5) the pairs of teams were then joined by another pair of teams, and they reconciled the turbulence ratings again, and (6) the remaining two teams joined and again reconciled the ratings to reach a final consensus for the scale Table 1 provides detail on the environmental turbulence scale

Although we did not formally hypothesize a role for the sensemaking construct, we expect that it acts as a covariate with regard to knowledge application Thus, we operationalized it on the basis of Weick's (1995) conceptualization The measure consisted of five items that focused on sensemaking by boundary-spanning materials-acquisition executives in IRs (e g , "In our supplier relationship, we constantly assess and analyze the effects of our decisions so that we know what adjustments to make") Other items addressed firms' identifying and understanding mistakes, understanding successful activities and programs, and understanding the effects of actions and decisions and various adjustments to them in the relationship Respondents indicated the extent of their disagreement or agreement on a seven-point scale (1 = "disagree," 7= "agree")

Results

Measure Validation

We used confirmatory factor analysis (CFA) for measure validation The χ^2 for the model of all the first-order reflective constructs was 447 86, with 242 degrees of freedom The comparative fit index (CFI), normed fit index (NFI), and nonnormed fit index (NNFI) were 97, 94, and 97, respectively The ranges of loadings for each measure as well as construct reliabilities and average variance extracted (AVE) are shown in the Appendix Construct reliabilities were 91 or greater, exceeding the benchmarks that are suggested as acceptable (Nunnally and Bernstein 1994), AVEs were greater than 72 All the indicators loaded significantly and substantively on their hypothesized factors ($p <$ 001) To test for discriminant validity, we ran a series of nested CFA model comparisons in which we constrained the covariance between each pair of reflective constructs to one (Anderson and Gerbing 1988) For all pairs, when we compared the constrained model with a free model, the difference was significant, which indicates discriminant validity We also examined the variance extracted by each construct relative to the squared correlation between construct pairs (Fornell and Larcker 1981) In all cases, the variance extracted by each factor exceeded the squared correlation between the factor pair, thus indicating discriminant validity

We developed the measures of the three knowledge stores as formative (Diamantopoulos and Winklhofer 2001, Edwards and Bagozzi 2000) Thus, the precision and thoroughness with which we established and tapped (content validity) the construct domains provided the major validation tool (Howell 1987) Our procedures in the preliminary stages of research, interviews, and pretesting, along with visual inspection of the scale items, provided evidence of content validity This procedure, along with the CFA results for the reflective measures, suggests that all the measures in this study are adequately reliable and valid

We estimated a second-order CFA for relationship quality, because we conceptualized it as a higher-order construct that comprised trust, commitment, and stability The target

TABLE 1
Turbulence Classifications and Sample Characteristics

Industry and SIC Range	Turbulence Level	Nature of Turbulence	Average Dollar Sales/ Revenues (in Millions)	Average Relationship Length	Average Number of Other Suppliers for Product Category	Average Percentage of Product Category Purchased from This Supplier	Average Percentage of Total Purchases from This Supplier	Average Percentage of Supplier's Sales Accounted for by This Relationship
Metal fabrications and products, 3411–3499	1 (n = 6)	In general, stable on most dimensions, moderate technology change, relative stability in competitive activity, composition, and demand	$229 0	14 2	4 5	65%	39%	13%
Industrial machinery and equipment, 3511–3599	2 (n = 41)	Reasonable new product introduction, innovation incremental in most sectors, relative stability in industry composition, competitive activity, and demand	33 6	14 1	6 2	66	40	18
Chemical and allied products, 2812–2899	3 (n = 26)	New product introduction and innovation significant in some sectors, reasonably intense competition, some alliances, relatively stable demand	26 6	11 0	3 0	78	58	13
Rubber and plastics, 3011–3069	4 (n = 22)	Reasonable rates of innovation and new products, relatively few new entrants, some alliance activity, somewhat dynamic and growing markets	173 0	11 7	2 7	64	35	15
Automotive transportation and equipment, 3711–3799	5 (n = 26)	Frequent new product introduction and incremental innovation, intense competition, heavy alliance activity, dynamic demand	232 0	8 1	4 6	68	39	22
Electronic and electric equipment, 3624–3647	6 (n = 48)	Strong activity on multiple fronts radical innovation, technology, new entrants, alliances, dynamic markets and demand, intense competition	177 0	12 0	3 7	62	40	21

coefficient, which compares the parsimonious second-order factor model with a measurement model that contains the three subconstructs, was at the acceptable level of 90 (Marsh and Hocevar 1985) As we expected, the three relationship-quality subconstructs loaded positively on overall relationship quality (i e , trust γ_1 = 94, t = 7 80, $p <$ 001, commitment γ_2 = 82, t = 8 49, $p <$ 001, stability γ_3 = 69, t = 6 15, $p <$ 001) The χ^2 for this model was 242 94 ($p <$ 01), with 88 degrees of freedom The fit indexes were CFI = 96, NFI = 94, and NNFI = 96 Reliability for the higher-order construct was 94 We provide descriptive statistics for latent constructs in Table 2

Hypothesis Testing

We used ordinary least squares regression to test our hypotheses We used the product term between the concerned latent constructs to test the interaction effects, we used the square of the latent constructs to test the hypothesized nonlinear effects Because product terms and the square terms can induce collinearity, we mean-centered the variables before we constructed the terms (Aiken and West 1996, Cronbach 1987) The reported results are based on mean-centered latent explanatory variables

The results show that the independent variables explain significant variance in relationship portfolio effectiveness (R^2 = 428, $p <$ 01) and relationship quality (R^2 = 121, $p <$ 01) For the hypotheses, the results indicate support for H_1, interactional knowledge stores enhance relationship portfolio effectiveness (b = 320, $p <$ 01) at an increasing rate (b = 122, $p <$ 01) We graph this nonlinear effect in Figure 2 We also find support for H_2, which proposes that rich interactional knowledge stores enhance relationship quality (b = 343, $p <$ 01)

The results do not indicate support for H_3, which suggests that functional knowledge stores positively affect relationship portfolio effectiveness (b = 049, $p >$ 33) In H_4, we expected that greater levels of functional knowledge stores would increase relationship quality at an increasing rate Although the linear term for functional knowledge stores is not statistically significant (b = 029, $p >$ 40), the nonlinear term is positive and significant (b = 069, $p <$ 05) for its effect on relationship quality, which provides support for H_4 According to our data, as the level of functional knowledge stores increases, relationship quality is enhanced at an increasing rate (see Figure 2)

In H_5 and H_6, we expected that the influence of environmental knowledge stores on relationship portfolio effectiveness and individual relationship quality would be greater in turbulent environments The results do not show support for H_5 Neither the main effect of environmental knowledge store on relationship portfolio effectiveness (b = – 039, $p >$ 62) nor its interaction with environmental turbulence is statistically significant (b = 013, $p >$ 33) Likewise, the main effect of environmental knowledge stores on relationship quality is not statistically significant (b = – 050, $p >$ 56) However, we find limited support for H_6, the effect of envi-

FIGURE 2
Interpretation of Nonlinear Effects

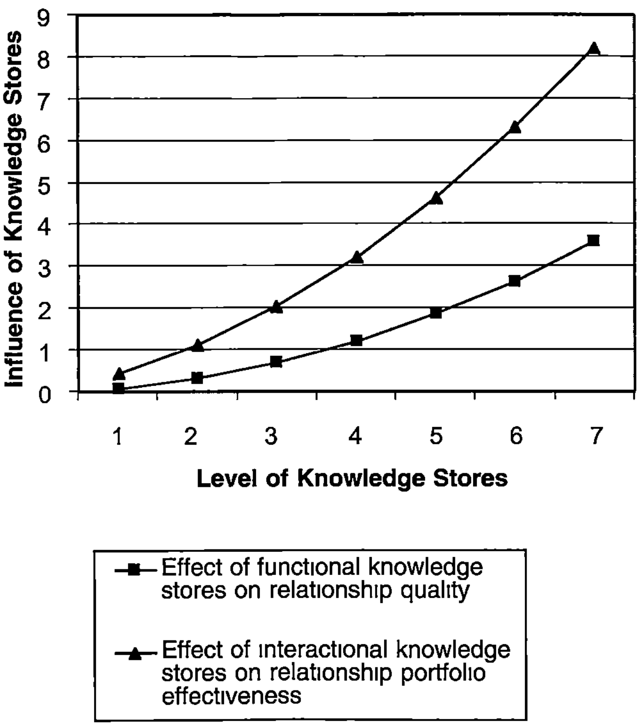


TABLE 2
Descriptive Statistics: Mean, Standard Deviations, and Correlations

	1	2	3	4	5	6	7
1 Interactional knowledge stores	1 00						
2 Functional knowledge stores	78**	1 00					
3 Environmental knowledge stores	66**	70**	1 00				
4 Sensemaking	57**	56**	47**	1 00			
5 Relationship quality	32**	23**	19*	22**	1 00		
6 Relationship portfolio effectiveness	53**	47**	37**	58**	28**	1 00	
7 Environmental turbulence	– 06	– 01	– 08	01	– 02	03	1 00
Mean	4 86	4 59	4 17	5 18	5 73	5 10	2 83
Standard deviation	1 03	1 08	1 21	1 19	1 06	98	1 90

*$p <$ 05
**$p <$ 01

ronmental knowledge stores on relationship quality is moderated by environmental turbulence (b = 039, $p < 10$)

Post Hoc *Analysis of the Role of Turbulence*

Although preliminary hypotheses testing did not reveal a substantive pattern of moderation by environmental turbulence, powerful theoretical arguments indicate that there might be important effects that did not emerge in our analysis Thus, we probed the moderating effects of environmental turbulence more comprehensively through a *post hoc* dummy-variable analysis Specifically, for the environmental knowledge stores' impact on relationship portfolio effectiveness and relationship quality models, we replaced the turbulence index with six dummy variables, one for each level of environmental turbulence Elimination of the constant term in the equation accommodated for the six dummy variables Using the dummy variables and environmental knowledge stores, we created six product terms to reflect the influence of the knowledge store on the outcome for each of the six levels of turbulence (again, we deleted the main effect of environmental knowledge stores to accommodate the six interactions)

The middle section of Table 3 shows results for the dummy-variable turbulence model (although we included all original explanatory variables in the *post hoc* analysis, for parsimony and clarity, we report only the moderation results in Table 3) As is shown, environmental knowledge stores positively influence relationship portfolio effectiveness for Turbulence Level 3 but negatively for Level 4 For relationship quality, environmental knowledge stores' effects are positive for Turbulence Levels 3–5 To further examine differences in the influence of the environmental knowledge stores across environmental conditions, we used Wald tests to compare the coefficients reported in the middle of Table 3 (for each knowledge store, there are 15 such comparisons, i e , ${}^6C_2 = 15$) The comparisons shown in the lower section of Table 3 indicate that in our data, the influence of environmental knowledge stores on relationship portfolio effectiveness and relationship quality varies from one level of turbulence to another For example, the effects of the environmental knowledge store on relationship portfolio effectiveness differ significantly between Turbulence Level 3 and the other five levels (Levels 3 and 2 b = 809, $p < 01$, Levels 3 and 1 b = 796, $p < 01$, Levels 4 and 3 b = –1 053, $p < 01$, Levels 5 and 3 b = – 861, $p < 05$, and Levels 6 and 3 b = – 733, $p < 01$) Consistent with H_5 and H_6, the *post hoc* analyses reveal that environmental knowledge stores influence IR outcomes differently in various environmental conditions

The Role of Sensemaking in IR Knowledge Store Development

Although we did not formally specify hypotheses regarding the role of sensemaking, we treat it as a covariate and test its effect on relationship portfolio effectiveness because, at a broader level, sensemaking can facilitate how IRs work together as a group Furthermore, sensemaking can determine how various relationships complement one another, and how each works in conjunction with others (e g , Bensaou and Venkatraman 1995) The results show that sensemaking has a positive, direct influence on relationship portfolio effectiveness (b = 386, $p < 01$)[1]

With regard to the role of sensemaking in knowledge store development, the correlations reported in Table 2 show a strong pattern of association between sensemaking and the IR knowledge stores The coefficients of 57 ($p < 01$), 56 ($p < 01$), and 47 ($p < 01$) for interactional, functional, and environmental knowledge stores, respectively, provide preliminary evidence of a strong role for sensemaking in knowledge development To explore the question of environmental moderation in knowledge store development, we performed the same *post hoc* analysis as we did with the outcomes of knowledge stores As the results in Table 4 show, 17 of the 18 coefficients for sensemaking are positive and statistically significant ($p < 05$), which indicates that in most environmental conditions, sensemaking positively influences IR knowledge stores The Wald test results in Table 4 show that for interactional and environmental knowledge stores, the influence of sensemaking differs across turbulence However, this difference is not a simple linear difference that can be captured by one interaction term For example, in the case of interactional knowledge stores, sensemaking has a greater impact for Turbulence Level 6 than for Level 2 (b = 272, $p < 05$) and Level 4 (b = 276, $p < 01$) However, the effect of sensemaking on interactional knowledge stores is lower for Turbulence Level 6 than for Level 3 (b = – 209, $p < 05$) Nonetheless, our data indicate that sensemaking is important in developing knowledge stores, and its effects vary depending on the level of environmental turbulence

Discussion

We drew on the absorptive capacity perspective to extend our understanding of relational capability We advanced the notion that relational capability derives from the development, and particularly the leveraging, of knowledge stores specific to the domain of IR making and management An important issue in our research involves the differential effects of the three knowledge subdomains (relational, functional, and environmental) that underpin interfirm relational capability As we expected, our results imply that the three relational knowledge stores indeed generate different outcomes in individual IRs and in terms of a firm's IR portfolio

Interactional knowledge stores seem to be an important factor in terms of both the magnitude and the consistency of their effects The knowledge stores strongly influence individual IR quality and have broader-based implications for the IR portfolio The influence on portfolio effectiveness

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[1] An interesting question that arises is whether the three knowledge stores mediate the influence of sensemaking on relationship portfolio effectiveness To test this, we estimated a model in which sensemaking affected relationship portfolio effectiveness in the absence of the influence of the knowledge stores (b = 513, $p < 01$) Because this coefficient is substantially greater than the coefficient estimated in the presence of the knowledge stores (i e , b = 386, $p < 01$) in absolute magnitude, we have evidence for partial mediation (Baron and Kenny 1986)

TABLE 3
Ordinary Least Squares Results

	Relationship Portfolio Effectiveness		Relationship Quality	
Explanatory Variable	Unstandardized Parameter Estimate	Standard Error	Unstandardized Parameter Estimate	Standard Error
Interactional knowledge stores	320***	109	343***	111
Functional knowledge stores	049	115	029	121
Environmental knowledge stores	– 039	079	– 050	088
Environmental turbulence	028	031	006	034
Sensemaking	386***	079	—	—
Interactional knowledge stores^2	122***	037	—	—
Functional knowledge stores^2	—	—	069**	034
Environmental knowledge stores × turbulence	013	030	039*	029
	R^2 = 428		R^2 = 121	

Environmental Knowledge Stores at Environmental Turbulence Levels[a]

Lowest (1)	– 059	117	– 096	123
Somewhat low (2)	– 072	094	– 168	134
Moderate (3)	737***	267	348*	213
Fair (4)	– 316**	175	521***	155
Somewhat high (5)	– 124	319	684***	155
Highest (6)	005	130	– 018	113

Wald Tests Comparing Moderation of Environmental Turbulence on Outcomes[b]

(6) – (5)	129	336	– 702***	174
(6) – (4)	320*	219	– 539***	192
(6) – (3)	– 733***	291	– 366*	234
(6) – (2)	076	144	151	151
(6) – (1)	063	156	078	145
(5) – (4)	192	365	162	217
(5) – (3)	– 861**	405	336*	243
(5) – (2)	– 053	324	852***	186
(5) – (1)	– 066	330	780***	176
(4) – (3)	–1 053***	313	173	252
(4) – (2)	– 244	191	690***	199
(4) – (1)	– 257	201	617***	191
(3) – (2)	809***	263	516**	232
(3) – (1)	796***	270	444**	215
(2) – (1)	– 013	118	– 073	153

*$p \leq$ 10
**$p \leq$ 05
***$p \leq$ 01

[a] For each regression model, we created six dummy variables (Variable 1 represents the lowest level of turbulence, and Variable 6 represents the highest level) For each model, we created six interaction terms for environmental knowledge stores In all models, we included the other remaining explanatory variables So a significant effect in the original consequences model implies a significant effect on the outcome at that level of turbulence

[b] We calculate the coefficient for the Wald test as $b = b_1 - b_2$, where for the first test (i e , [6] – [5]), for interaction knowledge stores, b_1 = 669 and b_2 = 704 (see Table 3) We calculate the standard error for the coefficient b as $SE(b) = [Var(b)]^{1/2} = [Var(b_1) + Var(b_2) - 2Cov(b_1, b_2)]^{1/2}$, where SE = standard error, Var = variance, and Cov = covariance (we report one-tailed tests) We show the difference in effects of environmental knowledge stores on outcomes between turbulence levels (e g , [6] – [5] implies the difference in the effects of environmental knowledge stores on relationship outcomes for SIC codes coded as 6 and 5, respectively, for turbulence)

Notes All the equations had a constant term, which we do not report for parsimony reasons, we report one-tailed tests

not only is strong but also gains momentum through positive feedback effects Evidently, investment in this particular knowledge store generates returns at an increasing rate for the firm Our results indicate that the benefits of this knowledge domain are not confined to one or a few limited relationships Rather, when this knowledge domain is developed, it is transferable and generalizable and, more important, can be parlayed repeatedly into positive outcomes for the firm

For functional knowledge stores, we expected that the benefits realized in an individual IR would multiply at an increasing rate In general, the data indicate that with respect to the individual relationship, investment in functional knowledge stores yields large payoffs, and these pay-

TABLE 4
Effects of Sensemaking on IR Knowledge Stores at Various Levels of Environmental Turbulence

Levels of Turbulence[a]	Interactional Knowledge Stores	Functional Knowledge Stores	Environmental Knowledge Stores
Lowest (1)	556***	664***	473***
Somewhat low (2)	379***	454***	768***
Moderate (3)	878**	939**	1 047***
Fair (4)	393***	571***	– 218**
Somewhat high (5)	704***	686***	819***
Highest (6)	669***	455**	617***

Wald Tests Comparing Moderation of Environmental Turbulence on Outcomes[b]

(6) – (5)	– 035	– 232	– 202
(6) – (4)	276***	– 116	843***
(6) – (3)	– 209**	– 484	– 431***
(6) – (2)	272**	001	151
(6) – (1)	113	– 209	144
(5) – (4)	311**	115	1 037***
(5) – (3)	– 174	– 253	– 228*
(5) – (2)	307*	233	353**
(5) – (1)	148	022	347**
(4) – (3)	– 485***	– 368	–1 265***
(4) – (2)	– 004	117	– 683***
(4) – (1)	– 163	– 093	– 690***
(3) – (2)	481***	485	581***
(3) – (1)	321***	275	574***
(2) – (1)	– 159	– 210*	– 007

*$p \leq$ 10
**$p \leq$ 05
***$p \leq$ 01

[a] For each regression model, we created six dummy variables (Variable 1 represents the lowest level of turbulence, and Variable 6 represents the highest level) For each model, we created six interaction terms for sensemaking Interactional knowledge stores R^2 = 39, functional knowledge stores R^2 = 36, and environmental knowledge stores R^2 = 29

[b] We calculate the coefficient for the Wald test as $b = b_1 - b_2$, where for the first test (i e , [6] – [5]), for interaction knowledge stores, b_1 = 669 and b_2 = 704 (see Table 3) We calculate the standard error for the coefficient b as $SE(b) = [Var(b)]^{1/2} = [Var(b_1) + Var(b_2) - 2Cov(b_1, b_2)]^{1/2}$, where SE = standard error, Var = variance, and Cov = covariance (we report one-tailed tests) We show the difference in effects of sensemaking on the three knowledge stores between turbulence levels (e g , [6] – [5] implies the difference in the effects of sensemaking on each knowledge store for SIC codes coded as 6 and 5, respectively, for turbulence

offs gain momentum and amplify We also believed that whereas functional knowledge would have some broader-based application over a firm's portfolio, it would be less generalizable and transferable Rather than leveraging the functional knowledge stores readily from one IR to another, only limited pockets of knowledge would transfer across IRs According to our data, functional knowledge does not have significant portfoliowide benefits This implies that learning about, for example, JIT or other inventory management systems in a relationship may not necessarily result in skills or subroutines that the firm can leverage to enhance the effectiveness of its relationships with other partners

Another focus of our research involves the moderating effects of environmental turbulence on the use of the environmental knowledge stores Although environmental knowledge does not affect outcomes in all conditions, *post hoc* investigations show a pattern of moderation by environmental turbulence In industries characterized by moderate levels of turbulence, environmental knowledge seems to enable portfolio effectiveness greatly It facilitates adjustments and reorientations in the portfolio to accommodate for some reasonable level of change in the environment However, at the highest level of turbulence, this knowledge may not be sufficient to cope with changes With respect to relationship quality, the effects of environmental knowledge stores are similar, though they come into play at somewhat higher levels of turbulence The magnitude of the differences in effects of environmental knowledge stores at various levels of industry turbulence suggests that marketing scientists must do more to understand how the management of IRs should differ in various environmental conditions Given our treatment of the environment at an industry level, examination of turbulence in terms of industry conditions may be useful

For the role of sensemaking, evidence indicates that it is strongly associated with the development of knowledge stores Furthermore, it seems that sensemaking enhances knowledge stores regardless of environmental conditions However, we must temper our conclusions somewhat with regard to two of the knowledge stores We have found what appears to be a nonlinear moderation effect between sensemaking and environmental turbulence for interactional and environmental knowledge stores (i e , the moderation occurs only at certain levels of turbulence and in certain forms, as opposed to a monotonic bilinear moderation) Although implications of this pattern of moderation are not entirely clear, in general, sensemaking seems to be most productive at medium to high levels of turbulence

Contributions and Managerial Implications

Scholars note that knowledge is crucial on several fronts, yet there is a scarcity of empirical research that investigates the role of knowledge, especially in IRs We advance the emergent literature on relational capabilities by showing that domain-specific IR knowledge stores play a crucial and complex role in developing and managing relationships Related to this, we advance the buyer–seller relationship literature by offering an expanded perspective on IR outcomes We augment traditional treatments of relationship quality (e g , Hibbard, Kumar, and Stern 2001, Jap 1999) by including a relationship portfolio perspective in accordance with recent assertions that close, partner-type relationships may not be universally desirable (e g , Buvik and John 2000)

In addition to the theoretical contributions, our research has several implications for managers Several leading companies (e g , BP, Ford, Coca-Cola, General Electric, Monsanto, IBM) have made knowledge management a top priority, on the basis of the premise that knowledge is crucial for competing in today's economy (Hackett 2000) On a broad level, our study validates the action of these companies and underscores the role of knowledge as a strategic resource

Furthermore, our study has implications for a firm's relationship-marketing strategy Examples of companies using relational knowledge stores are well documented in the customer relationship management literature In addition, firms can leverage their functional knowledge stores to enhance relationship quality in several ways For example, Intel has created personalized Web sites for 10,000 buyers in 400 companies to order its microprocessors, check their order status, and collaborate with engineers Although the personalized Web sites shorten the order-fulfillment cycles to some extent, their real value is in building and strengthening relationships with partners Cisco Systems' knowledge-exchange system connects its employees with its customers and suppliers By sharing information about sensitive issues such as sales forecasts, Cisco has been able to build trust with its channel partners (Knowledge Management 2001) Dell's Virtual Integration System enables it to share information and knowledge freely with its external suppliers on a real-time basis (Magretta 1998) Although the information sharing permits tighter coordination of the supply chain, it also helps develop higher-quality relationships

However, the results indicate that functional knowledge does not enhance overall relationship portfolio effectiveness This has implications for companies such as Toyota that have created a knowledge-sharing network with suppliers (Ahmadjian and Lincoln 2001, Dyer and Nobeoka 2000) According to our data, the leveraging of functional knowledge across a portfolio of IRs may not be productive, functional knowledge does not seem to transfer readily or to generalize across a range of relationships To capitalize on this knowledge, firms may be better off developing and leveraging functional knowledge stores that focus on individual relationships

Addressing an uncertain environment is an issue of importance to most managers Our research suggests that by developing knowledge bases about trends and changes in the external environment, firms are in a better position to manage relationships Consider an example from the food industry Manufacturers of food and consumer packaged goods own vast amounts of information on market trends, demographics, and consumer behavior Supermarkets have large databases of information on individual and household purchasing activity Seven manufacturers (Anheuser-Busch, Coca-Cola, Kraft Foods, Pillsbury, Procter & Gamble, Nabisco, and Warner-Lambert) and one supermarket chain (Wegmans Food Markets) combined the two sets of information to better manage their relationships with customers (Goldberg 2000) However, the usefulness and applicability of environmental knowledge stores is a function of the turbulence level in the industry environment Apparently, such knowledge stores can be leveraged most effectively in moderately turbulent industries

Another issue of importance for managers intent on capabilities development is the content of knowledge What type of knowledge results in strong capabilities and superior performance? Our research implies that there is no standard mix of knowledge Rather, the content domain of knowledge depends on the specific capability involved Firms should focus on knowledge that underpins capabilities in specific strategically crucial functional areas (e g , IRs) Even further, within these functional areas, the firm can and should build various relevant subdomains such that strong capabilities emerge Our research shows that the various knowledge subdomains have differential and sometimes nonlinear impacts, which implies that, as with other resources, firms must understand how to combine and leverage the subdomains for optimal outcomes

Our research suggests that the prudent manager should devote efforts and resources to sensemaking because it is critical in capabilities development Managerial focus on sensemaking may be even more vital than our data indicate because it can be broken down into specific actions and activities that can be trained and rewarded in the firm The literature is replete with admonitions that firms must be learning organizations and must "learn how to learn" With a focus on sensemaking, managers can isolate activities and skills necessary to the perpetual adjustment and reframing of events and cues Managers can be trained in the search for critical questions that need to be asked, even as they search for answers to the questions Personnel assessments and reviews could directly address sensemaking activities, linking them directly to performance evaluations and financial rewards for relevant managers and thereby reinforcing training efforts

Limitations and Further Research

The results of this study must be viewed in conjunction with its limitations A measurement concern involves the scope and domain of our formative measures for the IR knowledge stores The validity of formative measures hinges on extensive tapping of the construct domain, if not exhaustion of it Although our measures are well grounded in theory and fieldwork with managers, they are new

Therefore, construct domains need to be further verified and established In addition, our results may be strengthened by the inclusion of additional informants for each firm or perhaps by the development of objective measures Although we took precautions in questionnaire development and pretesting, and the results do not seem to indicate it, common methods variance can be problematic in single-informant survey data

Our research is the first we know of that has empirically verified the existence of environmental moderation in learning Furthermore, this moderation is quite complex in form and warrants further investigation before any detailed conclusions can be drawn Our measure for environmental variance has the important advantage of being derived from objective secondary data However, it is ordinal in nature and is based on assessments of industry conditions Given that reasonably strong findings emerged with this objective but somewhat limited environmental turbulence measure, it is critical to managers and researchers that this issue be extensively addressed in further research A multifaceted measure of environmental turbulence may reveal more about this complex and subtle phenomenon

Although this study offers important groundwork for understanding IR knowledge stores, more research is needed on how the knowledge is developed Related to this, tracking the evolution of sensemaking skills and their implications for knowledge creation would be useful Another issue in this research and all capabilities and learning research is the connection to firm-level performance outcomes The firm is necessarily driven by the need to "take it to the bank" Performance implications of learning and capabilities have strong and compelling theoretical grounding, but how and when do they play out in firm performance? These issues are difficult ones, but it is critical to address them in the IR context

Appendix
Measures

Knowledge Stores (New Scale; Formative)

(Scale items anchored by 1 = "very little knowledge" and 7 = "lots of knowledge")

Interactional

1. Negotiating with suppliers
2. Planning and management of partnering activities
3. Initiating and implementing cooperative programs with suppliers
4. Using computers to network and communicate with suppliers
5. Managing conflict with suppliers

Functional

1. Cost-reduction strategies involving suppliers
2. Working with supplier to develop products
3. Working with suppliers to reduce delivery times
4. Working with suppliers on quality management
5. Integrating suppliers into the firm's JIT system
6. Enhancing suppliers' production capabilities and capacities

Environmental

1. Laws and regulations relevant to supplier relationships
2. Market conditions affecting buying
3. Labor conditions in supplier firms
4. Competitors' purchasing behaviors

Relationship Quality (Conceptualized as a Higher-Order Construct That Consists of ...)

Trust (scale adapted from Doney and Cannon 1997)

(Construct reliability = 95, AVE = 75, range of loadings 85–91, scale items anchored by 1 = "strongly disagree" and 7 = "strongly agree")

1. This supplier keeps promises made to our firm
2. This supplier is always frank and truthful with us
3. We believe the information this supplier provides us
4. This supplier is genuinely concerned that our business succeeds
5. When making decisions, this supplier considers our welfare as well as their own
6. This supplier is trustworthy

Commitment (scale adapted from Anderson and Weitz 1992)

(Construct reliability = 94, AVE = 77, range of loadings 78–95, scale items anchored by 1 = "strongly disagree" and 7 = "strongly agree")

1. We have a strong sense of loyalty to this supplier
2. We expect this supplier to be working with us a long time
3. We are willing to make long-term investments to help this supplier
4. We are really committed to developing a working relationship with this supplier
5. We see this relationship as a long-term alliance

Relationship stability (new scale)

(Construct reliability = 91, AVE = 73, range of loadings 74–95, responses ranged from 1 to 7 on bipolar adjectives)

1. Stable/unstable (reverse coded)
2. Long-term/short-term (reverse coded)
3. Insecure/secure
4. Unsteady/steady

IR Portfolio Effectiveness (New Scale)

(Construct reliability = 91, AVE = 72, range of loadings 80–90, scale items anchored by 1 = "strongly disagree" and 7 = "strongly agree")

1. For the most part, our supplier relationships are very effective
2. Across the board, our supplier relationships operate well for us
3. Our supplier relationships do everything we need them to do and more
4. In general, we find our supplier relationships to be very productive and efficient

Sensemaking (New Scale)

(Construct reliability = 91, AVE = 73, range of loadings 76–93, scale items anchored by 1 = "strongly disagree" and 7 = "strongly agree")

In our supplier relationships

1 If something seems to be going wrong, we try hard to figure out why
2 We quickly try to identify our mistakes so that they are not repeated
3 If a program is successful, we try to understand what makes it work well
4 If we see a mistake has been made, we retrace our actions to understand what happened
5 We constantly assess and analyze the effects of our decisions so that we know what adjustments to make

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Michael J. Barone, Kenneth C. Manning, & Paul W. Miniard

Consumer Response to Retailers' Use of Partially Comparative Pricing

Consumers sometimes encounter a combination of comparative and noncomparative prices in the marketplace. For example, a grocer may employ signage that provides favorable price comparisons with those of a competitor for a portion of its products, a practice that the authors refer to as "partially comparative pricing." The authors examine the effects of partially comparative pricing on consumer response and find that it has both desirable and undesirable effects. On the one hand, such pricing enhances consumers' beliefs about the relative prices of comparatively priced products and about the retailer's relative prices in general. On the other hand, such pricing also reduces consumers' relative price beliefs about noncomparatively priced products and their intentions to purchase such products. The authors further show that the adverse influence of partially comparative pricing stems from consumers' suspicions about why price comparisons exist for some, but not all, products. They also document how these effects depend on store patronage. They discuss implications of their research and provide suggestions for future empirical efforts.

When walking down the aisles of a major grocery store chain, consumers encounter point-of-purchase (POP) signage for some products that indicates the store's lower price relative to that of a competing grocery chain (e.g., Miller Lite 12-pack: our price, $6.99; Cub Foods price, $8.69). For this subset of comparatively priced products, consumers have price comparisons available to consider during their decision-making process. Elsewhere in the store are noncomparatively priced products for which the grocer has provided only its prices (e.g., Clorox Bleach, 96-ounce container: our price, $1.43). Partially comparative pricing (i.e., the combination of comparative and noncomparative prices) is not limited to the grocery industry. Kmart recently undertook a "Dare to Compare" campaign in which in-store signs indicated its lower prices compared with those of key competitors (e.g., Target) on certain items (Merrick 2001a, b). Although partially comparative pricing is common at the point of purchase, it can also be presented on Web sites and in advertisements.

Previous research (e.g., Compeau and Grewal 1994; Grewal, Marmorstein, and Sharma 1996; Lichtenstein, Burton, and Karson 1991) has examined the effects of comparative price claims on consumers' perceptions of a comparatively priced product's pricing and value. However, unexplored is the potential impact of price comparisons that detail a retailer's superiority for some products on consumers' perceptions about other products carried by the retailer that are priced noncomparatively. As we elaborate in the following section, there are reasons to suspect that partially comparative pricing influences consumers' relative price beliefs about noncomparatively priced products. An understanding of the existence of such effects is important because these beliefs can influence consumer search (e.g., Urbany 1986) and choice behavior (e.g., Briesch et al. 1997; Winer 1986).

Research Hypotheses

Although the influence of comparative prices on consumers' perceptions of the pricing of subsequently encountered noncomparatively priced products has yet to receive empirical attention, previous research suggests several competing hypotheses regarding the potential nature of such effects. In this regard, Pechmann (1996) finds that consumer processing of an advertisement that contains a price superiority claim for a featured service (e.g., an overnight mail service with morning delivery) results in beliefs of price superiority for a nonfeatured service (e.g., overnight mail with afternoon delivery) that the advertisement never presents.

Pechmann's (1996) results may have arisen from inferential processes. For example, relative price beliefs for the nonfeatured service can stem from probabilistic inferences if consumers use beliefs about the company's price superiority for the comparatively priced service to form relative price beliefs about the nonfeatured service (Alba and Hutchinson 1987; Dick, Biehal, and Chakravarti 1990). In contrast, under evaluative-consistency inferencing (Alba and Hutchinson 1987; Dick, Biehal, and Chakravarti 1990), consumers may infer relative prices for the nonfeatured service from more global input (e.g., an overall perception of price superiority for the featured company that is based on comparative price information that indicates this superiority). By means of similar inferential processes, in the context of partially comparative pricing, consumers may employ comparative price claims (which reflect the price superiority of the featured retailer) to infer that the retailer

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also offers lower prices on noncomparatively priced products.

Although beliefs that a featured retailer offers lower prices than a competitor for noncomparatively priced products are inapplicable to Pechmann's (1996) research setting (which focuses on price beliefs about a nonfeatured service), such beliefs can also arise through priming. Under priming, cognitions activated during the processing of comparative price information may prompt interpretation of noncomparative prices in a manner consistent with the implications of the price comparison (see Herr 1989). Priming has been shown to explain why superiority claims about nonprice attributes may lead to perceptions of a competitive advantage for other product features that are described noncomparatively in the same advertisement (Barone and Miniard 1999).

In the present context, the price advantages associated with comparatively priced products may lead consumers to interpret noncomparative prices more favorably in terms of how they fare compared with the prices of the competitor referenced in the comparisons. In this regard, both inferencing and priming suggest a beneficial impact of partially comparative pricing.

H_1: Partially comparative pricing enhances relative price beliefs about noncomparatively priced products.

When consumers encounter partially comparative pricing, they may make other, less favorable inferences about noncomparatively priced products. Kalra and Goodstein (1998) report that price comparisons lead to greater price sensitivity. The enhanced price sensitivity following the processing of comparative price claims should lead consumers to pay more attention to price when they encounter noncomparatively priced products. In so doing, the lack of price comparisons should be rather conspicuous. Recognition of the "missing" comparisons for the noncomparatively priced products may evoke what Wright (1986) refers to as a "secrecy" schema, which prompts consumers to become suspicious about why certain information is presented (e.g., price comparisons for comparatively priced products) and other information is not (e.g., price comparisons for noncomparatively priced products). Suspicion has been defined in the literature as a psychological state that occurs in the presence of ulterior motives (Campbell and Kirmani 2000; Fein 1996; Fein, Hilton, and Miller 1990). In the present context, consumers who are suspicious of partially comparative pricing may infer that price comparisons are not provided for noncomparatively priced products because the retailer charges more than its competitor for such products. Such inferences may be especially prevalent among consumers who perceive partially comparative pricing as a way to manipulate their pricing beliefs (Campbell 1995). This line of reasoning suggests that partially comparative pricing may actually exert certain detrimental effects.

H_2: Partially comparative pricing undermines relative price beliefs about noncomparatively priced products.

Although the preceding discussion has considered why partially comparative pricing might enhance or undermine relative price beliefs about noncomparatively priced products, it is also possible that partially comparative pricing does not affect these beliefs. Perhaps consumers are too preoccupied with the shopping tasks at hand to pay much attention to either price comparisons or the lack thereof (Dickson and Sawyer 1990). Even if they notice the missing comparisons, they may have more important things to think about than why the retailer provides comparisons for only some of its products. However, both an awareness of partially comparative pricing and consequent thinking about the reason for the absence of price comparisons are necessary to arouse the type of suspicion that underlies H_2.

Similarly, neither inferencing nor priming may occur as H_1 presumes when consumers encounter partially comparative pricing. Simmons and Lynch (1991) observe that inferences may be infrequent even when the absence of information is conspicuous. In the present context, consumers may not believe that a retailer's price advantages in some product categories are a sufficient basis for inferring similar advantages in other categories. Nor can the favorable priming effect of comparative price claims take place if consumers do not attend sufficiently to price comparisons at the point of purchase. These various possibilities suggest that relative price beliefs about a retailer's noncomparatively priced products will be unaffected by partially comparative pricing.

H_3: Partially comparative pricing does not influence relative price beliefs about noncomparatively priced products.

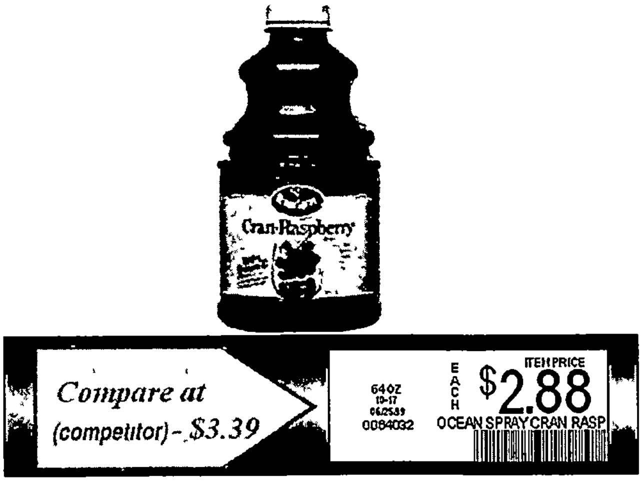
Study 1

Method

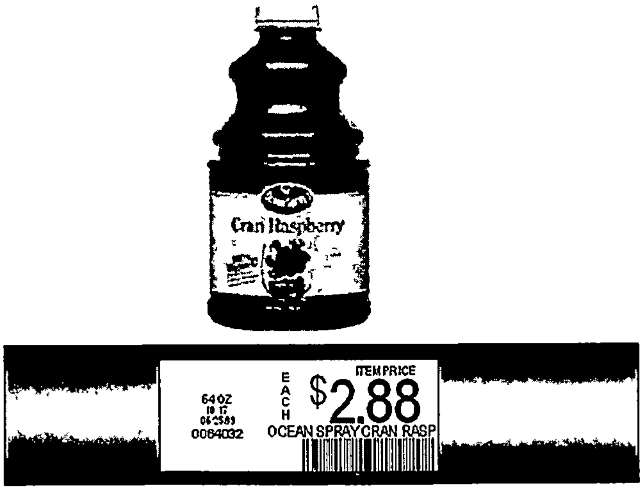
A total of 124 undergraduate business students at a Western university participated in Study 1. The students were instructed that they would encounter some of the products available from a grocery retailer called Johnston's that was planning to expand into the local market. In addition, they were told "When looking at these products, please imagine that you are making a small grocery-shopping trip and are considering whether or not you should buy them." Participants were assigned randomly to two POP price-information conditions (partially comparative pricing and noncomparative pricing). As in previous retail pricing studies (e.g., Miyazaki, Sprott, and Manning 2000), the POP stimuli included pictures of four food products, each centered above illustrated shelves that contained tags that included the price of each item. We manipulated the format of the price claim for two of the products between the two conditions. The partially comparative pricing condition included competitive reference prices for the first two products (cranberry juice and cup-of-noodles), such that Johnston's price was followed by the product's (higher) price at an actual competitor store in the market in which we conducted the study. Only Johnston's price was shown next to the remaining two products (pickles and potato chips). The noncomparative pricing condition featured only Johnston's price for all four products. Figure 1 (Panel A) includes a shelf price tag for a comparatively priced product from the partially comparative pricing condition; we omitted reference to the comparison-store price in the noncomparative price-information condition (see Figure 1, Panel B).

FIGURE 1
Representations of Pricing Stimuli: Study 1

A. Comparative Pricing



B. Noncomparative Pricing



To determine which prices to use in the POP stimuli, we gathered price information from four major grocery chains. We adjusted Johnston's prices, which were held constant across conditions, to approximately 15% less than the average price for each of the four products ($2.88 for cranberry juice, $.40 for cup-of-noodles, $2.24 for pickles, and $1.19 for potato chips), and we set the competitor store prices (presented only in the partially comparative pricing condition) at approximately the average price ($3.39 for cranberry juice and $.51 for cup-of-noodles). After examining the price information, participants provided relative price beliefs for each product without returning to any of the price information they had previously encountered.

We used relative measures (see Grewal et al. 1997; Miniard et al. 1993; Rose et al. 1993) to gauge price beliefs for Johnston's compared with those of the competitor referenced in the partially comparative pricing condition. For each product, participants indicated the likelihood that Johnston's price was lower than the comparison store on a scale that ranged from 1 = "very unlikely" to 9 = "very likely."

Results

We first considered evidence germane to the success of the price manipulation, which involved varying the presence of price comparisons for the initial two products (cranberry juice and cup-of-noodles) presented in the POP stimuli. We submitted responses to the relative price-belief measures for these products to a 2 (price information: partially comparative pricing versus noncomparative pricing) × 2 (product: cranberry juice versus cup-of-noodles) mixed analysis of variance (ANOVA) in which price information served as a between-subjects factor and product served as a within-subjects factor. Cell means are presented in Table 1.

The analysis yielded a significant main effect for the price manipulation ($F_{1,123} = 35.94$, $p < .001$, $\eta^2 = .226$). As we expected, participants in the partially comparative pricing condition were more likely than participants in the noncomparative pricing condition to believe that Johnston's had lower prices than the comparison store for the comparatively priced products. Although the main effect for the product factor was not significant ($p > .8$), a marginally significant ($F_{1,123} = 3.57$, $p < .1$, $\eta^2 = .029$) interaction emerged, indicating a stronger effect of the price manipulation for cranberry juice ($F_{1,123} = 47.5$, $p < .001$, $\eta^2 = .279$) than for cup-of-noodles ($F_{1,123} = 13.08$, $p < .001$, $\eta^2 = .096$). Apparently, participants interpreted the $.51 difference for juice (featured-store price: $2.88; comparison-store price: $3.39) as representing a stronger price advantage than the $.11 difference for noodles (featured-store price: $.40; comparison-store price, $.51).

Participants' relative price beliefs about the two products for which noncomparative prices were presented in both conditions (pickles and potato chips) provided evidence relevant to our competing hypotheses. The results of a 2 (price information) × 2 (product) mixed ANOVA show a significant effect for only the price-information manipulation ($F_{1,123} = 5.59$, $p < .05$, $\eta^2 = .044$; for all other effects, $p > .2$). Consistent with H_2, compared with participants in the noncomparative pricing condition, participants in the

TABLE 1
Cell Means for Relative Price Beliefs: Study 1

Product	Noncomparative Pricing	Partially Comparative Pricing
Cranberry juice[a]	5.44 (1.95)	7.73 (1.77)
Cup-of-noodles[a]	5.85 (2.60)	7.37 (2.03)
Pickles[b]	5.15 (1.75)	4.60 (2.20)
Potato chips[b]	5.48 (2.10)	4.48 (2.78)

[a] Comparatively priced product in the partially comparative pricing condition.
[b] Noncomparatively priced product in the partially comparative pricing condition.
Notes: Standard deviations are in parentheses. Product-belief measures (how likely it is that Johnston's has a lower price than comparison store) are 1 = "unlikely" and 9 = "likely."

partially comparative pricing condition believed that it was less likely that Johnston's had lower prices than the comparison store. Although the product type and the price-information manipulation did not interact ($p > .2$), contrasts revealed that the effect of the price-information manipulation was significant for potato chips ($F_{1,122} = 6.43$, $p = .01$, $\eta^2 = .05$) but not for pickles ($F_{1,122} = 2.31$, $p = .13$, $\eta^2 = .019$).

Discussion

The results from Study 1 support the potential for consumers' relative price beliefs about noncomparatively priced products to be affected by exposure to comparative pricing for other products. In accordance with H_2, partially comparative pricing significantly undermined relative price beliefs about one of the two noncomparatively priced products tested in the study. Although the cell means for the remaining product also suggested an adverse influence of partially comparative pricing, the difference did not reach statistical significance. Accordingly, we executed another study using a different set of noncomparatively priced products to assess the robustness of any undesirable effects that arise from partially comparative pricing.

Presumably, the undermining of consumers' relative price beliefs should lessen the odds of their buying noncomparatively priced products. Unfortunately, Study 1 did not employ the type of product-specific purchase-intention measures needed to assess this possibility, which is a shortcoming that we remedied in Study 2. Nor did Study 1 examine whether partially comparative pricing influences consumers' general (i.e., not product specific) price beliefs about the retailer providing such comparisons. Although the featured retailer's lower prices for comparatively priced products should drive consumer opinions and evaluations in one direction, the effects observed for noncomparatively priced products should exert an opposite influence. We explore the net impact of the two countervailing influences on general price perceptions of the retailer in Study 2. We also address the potential impact on more general perceptions by measuring consumers' attitudes toward the retailer and their intentions to shop at the retailer. These additions should enable us to better evaluate the advantages and disadvantages of partially comparative pricing.

Beyond these measurement limitations, Study 1 did not examine the process that is presumed to be responsible for the observed effects. As we noted previously, when consumers encounter partially comparative pricing, they may speculate about the reasons for the absence of comparisons for noncomparatively priced products. Consumers who are suspicious of the missing price comparisons may attribute their absence to the featured store's charging more than its competitor for the noncomparatively priced products, thereby undermining the relative price beliefs about these products. From this perspective, suspicion plays a central role in shaping consumers' response to partially comparative pricing. Study 2 explores the influence of suspicion by testing the following hypothesis:

> H_4: Suspicion mediates the effects of partially comparative pricing on relative beliefs formed about noncomparatively priced products.

Study 2

Method

A total of 88 undergraduate students at a Midwestern university were assigned randomly to either the partially comparative pricing or the noncomparative pricing condition. The stimuli and processing conditions in Study 2 paralleled those from Study 1, with two exceptions. First, for purposes of generalizability, we used two different noncomparatively priced products (shampoo and cereal) in this study. Second, we conducted the study in a different market than Study 1, which necessitated a change in the competitor store referenced in the price comparisons.

We replaced the relative price-belief measures used in Study 1 with measures designed to provide a clearer indication of participants' perceptions of the retailers' relative prices. The measures from the initial study are ambiguous about whether the less favorable relative price beliefs observed for noncomparatively priced products reflect the opinion that (1) the featured retailer offered the products at higher prices than the comparison store or (2) both stores offered the products at the same price levels. Accordingly, participants in Study 2 reported their relative price beliefs on a response scale anchored by 1 = "[the competitor] charges a much lower price than [the featured store]" and 9 = "[the featured store] charges a much lower price than [the competitor]." The midpoint of the scale was labeled to reflect that the "[featured store] and [competitor] charge the same price," so that participants would understand which part of the scale they should mark if they believed that the stores were equal in their prices for the product.[1]

To assess the possible presence and influence of suspicion, participants were asked to explain their response to the price-belief measure presented for each product ("In the space provided in the box below, please explain why you answered the above question the way you did"). An initial examination of the data led to the formation of the following coding categories:

1. Suspicion regarding the lack of a price comparison (e.g., "There wasn't a comparison . . . so that leads me to believe that Johnston's was probably more expensive, or they would have compared themselves to [comparison store]"),
2. Uncertainty due to the lack of a price comparison ("Not sure since they don't compare the stores' prices"),
3. Perceived equality due to the lack of a price comparison ("Because I don't know the price at [comparison store], I would assume the prices are the same"),
4. Price comparisons for other products that reflect lower prices (e.g., "Since Johnston's has some lower prices, they are probably lower than [comparison store]"), and

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[1] To communicate our findings more easily, we recoded responses to the measures using endpoints of –4 ("competitor charges a much lower price than the featured store") and +4 ("featured store charges a much lower price than the competitor") and a midpoint of 0 ("featured store and competitor charge the same price"). Thus, negative responses that differ significantly from the midpoint reflect beliefs that the competitor store charges lower prices than the featured store, and positive responses that are significantly different from the midpoint indicate beliefs that the featured store has lower relative prices.

5. Other (e.g., "I believe the price was $3.59 for this product," "The price seems high but all cereal is high priced").

Two judges who were blind to the study's purpose coded responses. Interjudge agreement was 84%, and they resolved all disagreements through discussion. Following Campbell and Kirmani (2000), we computed a suspicion index based on the proportion of suspicious thoughts to total thoughts provided by each participant. We used this index to test the mediating role of suspicion (H_4).

After responding to the relative price-belief measure and explaining the reason for their response, participants indicated their relative intentions to purchase the product ("Assume that Johnston' groceries operated in the [city name] area and that you needed to purchase this product. Given this, where would you be more likely to buy it?") on a nine-point scale (1 = "More likely to buy it at [the competitor store]," 5 = "Equally likely to buy it at [either store]," 9 = "More likely to buy it at [the featured store]"). After the product-specific measures, participants encountered measures that pertained to the featured store. We assessed general (i.e., store-level) relative price beliefs using a nine-point scale that employed endpoints that mirrored the product-specific measures (1 = "In general, [the competitor] charges lower prices than [the featured store]," 5 = "In general, [the featured store] and [the competitor] have about the same prices," 9 = "In general, [the featured store] charges lower prices than [the competitor]").[2] We computed relative store attitudes as the average response ($r = .80$) to two nine-point measures ("Compared to [the competitor], my opinion of [the featured store] is more unfavorable/more favorable, more negative/more positive"). We also assessed relative shopping intentions on a nine-point scale (1 = "More likely to shop at [competitor]," 9 = "More likely to shop at [featured store]").

Results

Manipulation check results. To gauge the success of the price-information manipulation, we analyzed relative price beliefs for the two comparatively priced products (cranberry juice and cup-of-noodles) using a 2 (price information: partially comparative pricing versus noncomparative pricing) × 2 (product: juice versus cup-of-noodles) mixed ANOVA (cell means are presented in Table 2). We observed a significant ($F_{1,87} = 20.87$, $p < .001$, $\eta^2 = .195$) main effect associated with the price-information manipulation (for the product main effect, $p > .9$). In support of the manipulation, compared with participants in the noncomparative pricing condition, participants exposed to partially comparative pricing believed that Johnston's had a lower price than the comparison store for the two products for which a price advantage was conveyed. A price information × product interaction also emerged ($F_{1,87} = 8.45$, $p < .01$, $\eta^2 = .089$). As in Study 1, the price-information manipulation exerted a stronger effect on relative price beliefs for cranberry juice ($F_{1,87} = 64.58$, $p < .001$, $\eta^2 = .242$) than for cup-of-noodles ($F_{1,87} = 16.38$, $p < .01$, $\eta^2 = .083$).

TABLE 2
Cell Means for Relative Price Beliefs: Study 2

Product	Noncomparative Pricing	Partially Comparative Pricing
Cranberry juice[a]	.50 (1.82)	2.54 (1.44)
Cup-of-noodles[a]	1.00 (1.78)	2.03 (1.34)
Shampoo[b]	.50 (1.39)	–.57 (1.24)
Cereal[b]	.35 (1.35)	–.56 (1.23)

[a]Comparatively priced product in the partially comparative pricing condition.

[b]Noncomparatively priced product in the partially comparative pricing condition.

Notes: Standard deviations are in parentheses. Responses to the relative price-belief measures were recoded such that –4 = "competitor charges a much lower price than the featured store," 0 = "featured store and competitor charge the same price," and +4 = "featured store charges a much lower price than the competitor."

Findings involving relative price beliefs for noncomparatively priced products. We submitted the relative price beliefs for the two noncomparatively priced products to a 2 (price information) × 2 (product) mixed ANOVA (for cell means, see Table 2). Only the main effect of the price-information manipulation achieved significance ($F_{1,87} = 6.30$, $p = .001$, $\eta^2 = .128$; for all other effects, $p > .6$). Consistent with H_2, participants exposed to partially comparative pricing held less favorable relative price beliefs than did participants in the noncomparative pricing condition, which is an effect that held for both products (shampoo: $F_{1,88} = 10.97$, $p < .001$, $\eta^2 = .113$; cereal: $F_{1,88} = 8.11$, $p < .01$, $\eta^2 = .086$). Moreover, tests of the mean responses in the partially comparative pricing condition against the scale midpoint (representing perceived price equivalence between the featured store and its competitor) were significant for both shampoo ($M = -.57$, $t_{67} = -3.82$, $p < .001$) and cereal ($M = -.56$, $t_{67} = -3.76$, $p < .001$). The results show that participants who were exposed to the partially comparative pricing perceived the featured store as charging higher prices than the competitor for the noncomparatively priced products.

Findings involving the mediating role of suspicion. Next, we examined whether suspicion mediates the influence of partially comparative pricing on relative price beliefs about noncomparatively priced products. Based on Baron and Kenney's (1986) recommended procedure, an initial regression showed that the independent variable (partially comparative pricing versus noncomparative pricing) had a significant ($t = 3.55$, $p < .001$, $R^2 = .128$) effect on the dependent variable (average relative price belief for the two noncomparatively priced products, $M_{\text{partial comparative}} = -.57$, $M_{\text{noncomparative}} = .43$). A second regression demonstrated that the independent variable significantly ($t = 3.47$, $p = .001$, $R^2 = .123$) influenced the mediator variable (suspicion), such that there was a higher proportion of suspicious thoughts reported by participants in the partially comparative pricing condition ($M = .44$) than in the noncomparative pricing condition ($M = .01$). The final analysis involved regressing the dependent variable on both the independent and the mediating variables. Although the effect of suspicion was significant ($t = 7\ 53$, $p <$ 001), the effect of the price manipulation was eliminated ($t = 1\ 63$, $p >$ 1), in support of the mediating role of suspicion and H_4

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[2]We recoded responses to the global measures in the manner described in Note 1 for relative price beliefs.

We obtained further evidence about the importance of suspicion in determining participants' responses to partially comparative pricing by reanalyzing their relative price beliefs for noncomparatively priced products Previously, we reported the results of a 2 (price information) × 2 (product) mixed ANOVA for these beliefs We replicated this analysis after splitting participants in the partially comparative pricing condition into two groups on the basis of whether they expressed suspicion (n = 29) or did not express suspicion (n = 39) in their protocols for the two noncomparatively priced products The new analysis entailed a 3 (group partially comparative pricing and suspicious, partially comparative pricing and unsuspicious, noncomparative pricing) × 2 (product shampoo versus cereal) mixed ANOVA Only the group main effect was significant ($F_{1, 85} = 32\ 55$, $p <$ 001, $\eta^2 =$ 434, for all other effects, $p >$ 7) Pairwise comparisons revealed that participants in the partially comparative pricing and suspicious group provided relative price beliefs for the shampoo product ($M = -1\ 41$) that were significantly less favorable than those provided by participants in the partially comparative pricing and unsuspicious ($M =$ 05, $p <$ 000, $\eta^2 =$ 348) and the noncomparative pricing ($M =$ 50, $p <$ 000, $\eta^2 =$ 346) groups Similarly, for the cereal product, we observed less favorable relative price beliefs in the partially comparative pricing and suspicious group ($M = -1\ 40$) than in either the partially comparative pricing and unsuspicious ($M =$ 08, $p <$ 000, $\eta^2 =$ 367) or the noncomparative pricing ($M =$ 35, $p <$ 000, $\eta^2 =$ 316) group Beliefs in the partially comparative pricing and unsuspicious and the noncomparative pricing groups did not differ for either product ($p >$ 14)

Thus, two different response patterns emerged when we partitioned participants in the partially comparative pricing condition on the basis of their suspiciousness From this analysis, it is evident that the support for H_2 we observed in the previous aggregate analyses was driven by suspicious participants Unsuspicious participants' beliefs about the noncomparatively priced products were unaffected by partially comparative pricing, a result that supports the null effects predicted by H_3 Beyond documenting the role played by suspicion, these results illustrate the value of dividing participants in the partially comparative pricing condition into suspicion groups, a procedure that we adopt in subsequent analyses when appropriate

Findings involving relative purchase intentions for noncomparatively priced products The practical significance of the adverse effects of partially comparative pricing on beliefs about noncomparatively priced products would be substantially undermined if they did not carry over to participants' intentions to purchase the products Accordingly, we submitted their responses to the product-specific intention measures to a 3 (group) × 2 (product) mixed ANOVA The only significant effect to emerge from the analysis was the main effect of the group factor ($F_{1, 85} = 4\ 48$, $p <$ 05, $\eta^2 =$ 095, for all other effects, $p >$ 3) For the shampoo product, follow-up contrasts revealed that participants in the partially comparative pricing and suspicious group indicated less favorable purchase intentions ($M = -1\ 13$) than did participants in the partially comparative pricing and unsuspicious ($M = -$ 20, $p <$ 05, $\eta^2 =$ 072) and the noncomparative pricing ($M =$ 05, $p <$ 05, $\eta^2 =$ 092) groups Analogously, for the cereal product, we found less favorable intentions for the partially comparative pricing and suspicious group ($M = -1\ 24$) than for the partially comparative pricing and unsuspicious ($M = -$ 38, $p <$ 05, $\eta^2 =$ 076) or the noncomparative pricing ($M = -$ 15, $p <$ 05, $\eta^2 =$ 085) group No difference in intentions existed between the partially comparative pricing and unsuspicious and the noncomparative pricing groups for either product ($p >$ 58) Thus, the detrimental effect of partially comparative pricing on suspicious participants' beliefs about the relative price of noncomparatively priced products also existed for their intentions to purchase the products

Findings involving the featured store We next consider whether partially comparative pricing affected participants' responses to measures that involved the featured store by conducting separate one-way ANOVAs with general relative price beliefs, store attitudes, and store shopping intentions as the dependent variables and the three groups (partially comparative pricing and suspicious, partially comparative pricing and unsuspicious, and noncomparative pricing) as the independent variable We observed a significant effect for only general price beliefs ($F_{2, 84} = 4\ 08$, $p <$ 05, $\eta^2 =$ 089, for store attitudes and intentions, $p >$ 18) Follow-up contrasts revealed less favorable beliefs about the prices charged, in general, by the featured store compared with the comparison store for the noncomparative pricing group ($M =$ 30) and the partially comparative pricing and suspicious group ($M =$ 46) than for the partially comparative pricing and unsuspicious group ($M = 1\ 33$, for both comparisons, $p <$ 05) However, relative price beliefs provided by participants in the partially comparative pricing and suspicious group did not differ ($p >$ 7) from those provided by participants in the noncomparative pricing group

Discussion

Study 2 extends our understanding of consumers' reactions to partially comparative pricing in several ways It implicates suspicion as an important determinant of the relative price beliefs formed for noncomparatively priced products, suspicion fully mediated the effects of the price-information manipulation on such beliefs Moreover, participants who were suspicious of partially comparative pricing believed that the featured store's prices for noncomparatively priced products were more expensive than the competitor's prices In contrast, participants who were not suspicious of the absence of price comparisons for some products gave no indication that partially comparative pricing affected their relative price beliefs

Study 2 further shows that the adverse influence of partially comparative pricing on noncomparatively priced products is not limited to relative price beliefs about such products The likelihood of consumers buying these products is also reduced, as is evidenced by the results for the purchase-intention measures The findings underscore the potential risks faced by retailers pursuing this pricing strategy

Nonetheless, the adverse effects did not extend to participants' attitudes toward the retailer or to their intentions to patronize the retailer. Notably, unsuspicious participants' relative beliefs about the retailer's prices in general actually benefited from partially comparative pricing. Apparently, the highly favorable relative price beliefs formed after participants processed the price comparisons for the comparatively priced products carried significant weight in their impressions of the retailer's overall price position.

A limitation of our studies is their use of a fictitious store that uses partially comparative pricing. Consequently, we were unable to assess the reactions of shoppers who are most germane to a particular retailer, namely, its own patrons. Indeed, retailers should be most interested in how their customers respond to partially comparative pricing. Accordingly, we executed another study using existing retailers (Target and Wal-Mart) for the featured and comparison stores, which enabled us to understand how consumers who shop primarily at the featured store versus the comparison store respond to the use of partially comparative pricing.

There are at least two reasons to believe that consumer response to partially comparative pricing depends on store patronage. Prior research indicates that users of the competitive brand referenced in a comparative advertisement perceive comparisons as less informative (McDougall 1978), less credible (Prasad 1976), and ultimately less persuasive (Barone and Miniard 1999, Study 3; Wu and Shaffer 1987, Study 1) than do nonusers. These findings highlight the potential for comparisons to evoke particularly negative reactions from comparison-brand users who find their brand "under attack." As such, partially comparative pricing may engender greater suspicion in the minds of comparison-store patrons, thus causing them to respond more negatively than other consumers when forming their relative beliefs about noncomparatively priced products.

Consumers who shop primarily at the featured store may experience less suspicion than other consumers about the missing price comparisons for noncomparatively priced products. Campbell (1999) shows how consumers are lenient in their inferences about a retailer's pricing motives when the retailer possesses a positive rather than a negative reputation. Presumably, a store enjoys a good reputation among consumers who choose to shop primarily at that store. If so, featured-store shoppers should be less likely to infer that the retailer is withholding price comparisons for the noncomparatively priced products because it charges more than its competitor for the products. For these reasons, we propose the following hypothesis:

> H_5: Comparison-store shoppers respond more negatively than featured-store patrons to partially comparative pricing in terms of their relative price beliefs about noncomparatively priced products.

Beyond testing H_5, Study 3 also speaks to the robustness of our prior results. It does so by examining partially comparative pricing in a nongrocery retail environment and by using a real rather than a fictitious featured retailer. Moreover, Study 3 alters the ratio of comparatively to noncomparatively priced products in the partially comparative pricing condition. Products that are comparatively priced represent a minority of products encountered during the study, just as they typically constitute a minority of the products encountered in retail environments.

Study 3

Method

A total of 117 undergraduate business students were assigned randomly to either the partially comparative pricing or the noncomparative pricing condition. In both conditions, participants were exposed to prices charged by a major retailer (i.e., Target) for a set of ten products (cordless telephone, calculator, CD, personal stereo, batteries, backpack, printer, CD player, digital camera, and DVD). In the noncomparative pricing condition, participants were presented only with the featured retailer's prices, whereas in the partially comparative pricing condition, the prices of a major competitor (i.e., Wal-Mart) were also provided for the first two products.

After processing this price information, participants responded to measures of product-specific relative price beliefs and more general store perception that were similar to the measures in Study 2. Finally, participants indicated how many times in the past month they had shopped at the featured and comparison stores. We then categorized participants as either featured- or comparison-store patrons on the basis of whether they shopped at one of the two stores at least four times in the past month. We employed this criterion to ensure that participants categorized as featured-store (comparison-store) shoppers would perceive a level of association with the store that was consistent with the theoretical rationale presented previously. The categorization resulted in 38 featured-store patrons and 38 comparison-store patrons. We removed 41 participants who did not meet the criterion from the analysis. Thus, the study's research design involved a 2 (price information: partially comparative pricing versus noncomparative pricing) × 2 (store patronage: featured-store versus comparison-store patrons) between-subjects factorial design.

Results

Manipulation check results. Table 3 presents the cell means for the product-specific and store measures. We begin by examining relative price beliefs associated with the initial two products (telephone and calculator) for which we manipulated the presence of price comparisons. We analyzed the beliefs using a 2 (price information) × 2 (store patronage) × 2 (product) mixed ANOVA. We found a significant main effect ($F_{1,75} = 130.48$, $p < .001$, $\eta^2 = .644$) for the price-information factor, such that we observed more favorable relative price beliefs in the partially comparative pricing condition (in which the price information for the products reflected the superiority of the featured store, $M = 2.65$) than in the noncomparative pricing condition ($M = -.93$). This result supports the success of the price-information manipulation. The price information × product interaction was also significant ($F_{1,75} = 19.00$, $p < .001$, $\eta^2 = .181$) and indicated a stronger effect of the price-information manipulation for the calculator ($F_{1,75} = 154.84$, $p < .001$, $\eta^2 = .677$) than for the telephone ($F_{1,75} = 84.85$, $p < .001$, $\eta^2 = .534$). No other effect achieved significance ($p > .13$).

TABLE 3
Cell Means and Contrasts for Relative Price Beliefs: Study 3

Measures	Featured-Store Patrons Noncomparative Pricing	Featured-Store Patrons Partially Comparative Pricing	p	η^2	Comparison-Store Patrons Noncomparative Pricing	Comparison-Store Patrons Partially Comparative Pricing	p	η^2
Relative Price Belief								
Telephone[a]	– 71 (85)	2 45 (1 28)	000	683	– 90 (1 36)	2 06 (2 18)	000	418
Calculator[a]	– 77 (1 30)	3 00 (1 08)	000	726	–1 70 (97)	2 56 (2 12)	000	642
CD[b]	82 (1 63)	75 (1 12)	872	001	75 (1 10)	– 06 (75)	019	152
Personal stereo[b]	1 12 (1 41)	25 (1 16)	048	107	50 (1 29)	– 44 (1 06)	029	133
Batteries[b]	53 (1 12)	35 (1 09)	626	007	– 60 (74)	–1 44 (62)	001	271
Backpack[b]	24 (1 09)	– 45 (1 43)	116	069	10 (1 20)	– 94 (70)	004	216
Printer[b]	58 (1 58)	– 40 (1 39)	051	104	20 (1 41)	– 88 (81)	012	173
Radio[b]	58 (1 33)	– 65 (99)	003	232	20 (1 00)	– 94 (70)	000	342
Digital camera[b]	18 (1 78)	– 30 (1 26)	348	025	– 10 (1 58)	– 94 (93)	075	090
DVD[b]	41 (2 24)	– 25 (1 02)	243	039	25 (1 57)	– 94 (1 17)	018	154
Featured Store								
Relative price	–1 24 (95)	29 (1 56)	005	196	–2 45 (96)	–1 13 (1 56)	003	235
Relative attitude	2 23 (2 35)	2 33 (1 92)	985	000	54 (1 89)	92 (1 73)	411	020
Shopping intention	3 00 (1 34)	2 86 (1 47)	774	002	–1 55 (1 49)	–1 44 (1 93)	847	001

[a] Comparatively priced product in the partially comparative pricing condition

[b] Noncomparatively priced product in the partially comparative pricing condition

Notes Responses to the relative price-belief measures were recoded such that –4 = "competitor charges a much lower price than the featured store," 0 = "featured store and competitor charge the same price," and +4 = "featured store charges a much lower price than the competitor" A similar recoding occurred for the relative price, shopping intentions (–4 = "more likely to shop at competitor" and +4 = "more likely to shop at featured store"), and relative attitude (–4 = "more favorable attitudes for competitor than featured store" and +4 = "more favorable attitudes for featured store than competitor") measures

Findings involving relative price beliefs for noncomparatively priced products Next, we consider the relative price beliefs provided for the eight products that were noncomparatively priced in both conditions (for cell means, see Table 3) We submitted the relative price beliefs to a 2 (price information) × 2 (store patronage) × 8 (product) mixed ANOVA Significant main effects emerged for the price-information ($F_{1,75}$ = 38 04, $p <$ 001, η^2 = 252) and store-patronage ($F_{1,75}$ = 25 75, $p <$ 001, η^2 = 103) factors The price-information main effect indicated more favorable relative price beliefs for the noncomparative pricing condition (M = 13) than for the partially comparative pricing condition (M = – 39) The main effect of store patronage reflected more favorable relative price beliefs for featured-store patrons (M = 22) than for comparison-store patrons (M = – 44)

Contrary to H_5, the price information × store patronage interaction was not significant ($p >$ 5) This null effect suggests that featured- and comparison-store patrons did not differ in their responses to partially comparative pricing However, on the basis of our a priori expectations of the potential for comparison-store patrons to respond less favorably than featured-store users to partially comparative prices, we conducted a series of planned contrasts (Jaccard 1998, Winer, Brown, and Michels 1991) One-way ANOVAs that assessed the effect of the price-information manipulation in each shopper group uncovered considerable differences between the shoppers Test significance and explained variance (η^2) are shown in Table 3

Comparison-store patrons were highly responsive to the price-information manipulation For this group, relative price beliefs regarding seven of the eight noncomparatively priced products were affected by the price-information manipulation at the 05 alpha level, and the remaining product was significant at the 1 alpha level Moreover, the average explained variance was nearly 15% In contrast, similar ANOVAs for featured-store patrons revealed that their relative price beliefs regarding four of the eight noncomparatively priced products were unaffected by the price-information manipulation at the 1 level, only three attained significance at the 05 level The average explained variance was less than 9% Collectively, the additional analyses indicate that comparison-store patrons respond more negatively to partially comparative pricing than do patrons of the featured store, as H_5 predicted

Findings involving the featured store We submitted responses to the measures of general relative price beliefs, attitudes, and intentions regarding the featured store to separate 2 (price information) × 2 (store patronage) ANOVAs (for cell means, see Table 3) In support of the validity of the patronage classification procedures used in this study, we found a significant main effect of store patronage on all three measures ($p <$ 01), such that we detected more favorable responses for featured-store patrons than for comparison-store patrons The price-information manipulation also exerted a significant main effect on participants' general relative price beliefs ($F_{1,75}$ = 10 08, $p <$ 01, η^2 = 180) but not on their store attitudes or shopping intentions ($p >$ 67) Participants in the partially comparative pricing condition held more favorable beliefs about the featured store's relative prices in general than did participants in the noncomparative pricing condition Finally, the price information × store patronage interaction was not significant for any of these measures ($p > .56$).

Discussion

Despite changes in the retail category, the ratio of comparatively to noncomparatively priced products, and the use of an existing rather than a fictitious featured retailer, Study 3 again shows that partially comparative pricing (1) enhances consumers' relative price beliefs about comparatively priced products and the retailers' relative prices in general, (2) undermines relative price beliefs about noncomparatively priced products, and (3) has no influence on attitudes toward or intentions to shop at the retailer that uses the comparisons. Study 3 further reveals that the negative influence of partially comparative pricing on relative price beliefs about noncomparatively priced products holds for a retailer's own customers, though to a lesser extent than for comparison-store patrons.

General Discussion

A general finding from research on reference pricing is that price comparisons enhance consumers' perceptions of a product's value (Biswas, Wilson, and Licata 1993). However, this literature has not considered the potential impact of such comparisons on consumers' perceptions of a retailer's noncomparatively priced products. As such, existing research is unable to address the full range of effects that can arise when retailers adopt a partially comparative pricing strategy. Our research takes an initial step toward alleviating this gap in the literature. Specifically, we examine the impact of partially comparative pricing on relative price beliefs about comparatively priced products, relative price beliefs about noncomparatively priced products, intentions to purchase noncomparatively priced products, beliefs about a retailer's relative prices in general, attitudes toward the retailer, and intentions to shop at the retailer.

We find that partially comparative pricing has both desirable and undesirable consequences. A positive finding is that the pricing strategy enhanced participants' relative price beliefs about the comparatively priced products and about the retailer's prices in general.[3] Nonetheless, partially comparative pricing caused participants to hold less favorable relative price beliefs for noncomparatively priced products than those that existed in the absence of comparative price information. They also reduced participants' intentions to purchase the products. Finally, we observed no effect of partially comparative pricing on participants' attitudes toward the retailer or on their shopping intentions.[4] Accordingly, retailers should consider these trade-offs before using comparative price claims. Such comparisons should be employed only if their perceptual and behavioral benefits (e.g., beliefs that the featured retailer has lower prices that promote the purchase of comparatively priced products) exceed their related costs (e.g., beliefs that the featured retailer has higher prices that reduce the purchase of noncomparatively priced products).[5]

Beyond examining the various types of effects produced by partially comparative pricing, our research also explores whether suspicion is responsible for the effects' adverse influence on relative price beliefs about noncomparatively priced products. Suspicion prompted by the presence of partially comparative pricing is shown to mediate fully the effects observed for these beliefs. Moreover, participants exposed to partially comparative pricing who did not become suspicious held relative price beliefs about the noncomparatively priced products that were equivalent to those of participants who received only noncomparative prices. Thus, only participants who expressed suspicion about the lack of a price comparison held less favorable beliefs about the relative price of noncomparatively priced products.

The findings indicate that it is important for retailers that employ partially comparative pricing to manage consumers' perceptions of this tactic. Successful management of the level of suspicion associated with partially comparative pricing should help reduce its adverse effects. Development of low-price positioning for the retailer may help reduce suspicion that a retailer presents price comparisons for some but not all of its products because the noncomparatively priced products are more expensive. Store signage that claims that the retailer offers lower prices than a competitor for many items, including the featured set of comparatively priced products, might also help reduce suspicion. Conversely, retailers' use of price comparisons in a way that promotes suspicion should undermine relative price beliefs. For example, Kmart's "Dare to Compare" campaign triggered accusations from competitors that Kmart presented erroneous information in price comparisons (Merrick 2001a). Media coverage of a subsequent lawsuit filed by a Kmart competitor may have been sufficient to increase consumer suspicion toward the campaign The heightened suspicion may have prompted beliefs that Kmart charged higher prices than did the referenced competitors

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[3] This finding is consistent with the many studies that have concluded that external reference prices enhance price perceptions of the focal product. However, previous reference price research has typically employed nonrelative measures of perceived value of the offer, perceived savings, and shopping intentions (e.g., Berkowitz and Walton 1980; Lichtenstein and Bearden 1989; Urbany, Bearden, and Weilbaker 1988) rather than measures of relative price beliefs, as in the present research.

[4] A reviewer asked us to discuss why store attitudes and shopping intentions are not adversely affected by partially comparative pricing, given the suspicions it aroused and its negative effects on relative price beliefs about noncomparatively priced products. It should be recognized that partially comparative pricing produced countervailing effects. Beyond undermining beliefs about noncomparatively priced products, partially comparative pricing enhanced beliefs about the relative prices of comparatively priced products. Apparently, participants had more confidence in their relative price beliefs about the comparatively priced products than about the noncomparatively priced products, as is evidenced by the fact that beliefs about the retailer's relative prices in general were enhanced by its use of partially comparative pricing. This is to be expected, given that the former beliefs were based on actual price comparisons, and the latter beliefs needed to be inferred because of the absence of price comparisons. Even in the absence of such countervailing influences, changes in the price beliefs about a few of the thousands of products carried by the type of retailers examined in our research may not be sufficient to cause significant shifts either in how much consumers like a retailer or in their shopping intentions. Finally, although price is important, it is but one of a set of salient attributes that determine the attitudes and shopping intentions of many consumers. There appear to be several reasons why null effects occurred for store attitudes and intentions.

[5] We extend our appreciation to a reviewer for this insight.

Our research also explores the impact of store patronage on consumer response to partially comparative pricing Comparison-store shoppers displayed a more adverse reaction in their beliefs about noncomparatively priced products than did shoppers of the store that used partially comparative pricing Even so, the latter group still evidenced a detrimental influence of partially comparative pricing on their beliefs about noncomparatively priced products, thereby underscoring the relevance of our findings to retailers that implement or are contemplating this pricing strategy

Beyond the practical implications of our findings, they also bear on the persuasion knowledge literature An important research task that consumer researchers face involves improving the field's understanding of how consumers' knowledge about the marketplace can influence their responsiveness to persuasion tactics (Wright 2002) Consistent with this recommendation, researchers have examined consumers' interpretations of marketers' actions in advertising, personal selling, and pricing contexts (e g , Campbell 1995, 1999, Campbell and Kirmani 2000) The current inquiry complements existing work by providing additional evidence that suspicion is a key cognitive reaction that shapes consumer response to retailers' persuasion attempts Our findings further demonstrate that the existing relationship between consumer and retailer (i e , whether consumers shop at the retailer or its competitor) can be an important determinant of the favorability of consumers' responsiveness to persuasion tactics (e g , partially comparative pricing)

Limitations and Further Research

Although we believe that our research provides an important contribution by offering an initial exploration of consumer response to partially comparative pricing, there are particular limitations that warrant acknowledgment and discussion The strength of our findings' pragmatic implications hinges on the degree to which the effects observed in our studies occur in actual shopping environments Our experimental setting represents a processing environment devoid of the distractions encountered in stores The stimulus materials given to participants made the existence of price comparisons for some products and their absence for others plainly evident Consequently, it is possible that partially comparative pricing was more noticeable and thus received greater attention in our studies than would be the case in actual stores In turn, this would facilitate the emergence of effects

Only further research that examines consumer response to partially comparative pricing in more natural shopping environments can determine our findings' dependency on the methodology used in our studies In this regard, subsequent inquiries could examine the impact of partially comparative pricing in computer-simulated retail environments (Burke et al 1992) The assessment of consumer response in the marketplace itself offers the ultimate test Ideally, field experiments that examine whether the presence of partially comparative pricing reduces the sales of the retailer's noncomparatively priced products would be undertaken Statistical models (e g , logit) might also be able to estimate the effects of partially comparative pricing on a retailer's sales in a manner analogous to the use of such models in prior research that examines consumer response to same-store external reference prices (e g , Mayhew and Winer 1992) and price promotions (e g , Mela, Gupta, and Lehmann 1997)

Another feature of our experimental materials that limits their external validity is that they presented only a single brand in a product category Typically, retailers offer multiple brands in a product category If a comparative price is provided, it is usually limited to a single brand Note that retailers' practice of providing comparative prices for only one brand should enhance the chances of consumers noticing the existence of partially comparative pricing This observation somewhat diminishes reservations that partially comparative pricing is more noticeable in our studies than in actual shopping environments However, it points to our studies' silence on the potential influence of a comparatively priced brand on relative price beliefs about the remaining brands in the product category that are noncomparatively priced Would the same type of effects reported herein be found? Is it possible that consumers infer that the existence of a price advantage for one brand implies price superiority for other brands in the category, especially if the comparatively priced brand is the most expensive brand or a market leader? At this point, with the exception of Pechmann's (1996) research, little is understood about when a known price advantage for one product or brand is used to infer a price advantage for another product or brand

In addition, our research does not address several factors that may affect consumer response to partially comparative pricing For example, although our findings show adverse effects of partially comparative pricing for noncomparatively priced products among the retailer's own shoppers, we did not explore whether these effects might be lessened, perhaps to the point of disappearing, for a store's most loyal patrons As such, further research might consider the role of store loyalty in moderating the influence of partially comparative pricing Similarly, consumers' perceptions of a retailer's relative price positioning (e g , cheap versus expensive) in the marketplace and their knowledge about competitors' prices for noncomparatively priced products might also be important For example, if the featured retailer is perceived as an inexpensive place to shop, consumers might be more likely to generalize the price advantage of comparatively priced products to noncomparatively priced products If consumers know that the competitor referenced in the price comparisons charges the same or an even higher price than the featured retailer for a noncomparatively priced product, they should be unlikely to form unfavorable relative price beliefs

Finally, we should acknowledge that the adverse influence of partially comparative pricing was not present for all the noncomparatively priced products tested in our studies Although for some products the lack of statistical significance might reflect inadequate statistical power, this would not seem to explain all the null effects (e g , CDs and batteries for featured-store patrons in Study 3) The reason for such variations is unclear and awaits future investigation

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Vikas Mittal, Wagner A. Kamakura, & Rahul Govind

Geographic Patterns in Customer Service and Satisfaction: An Empirical Investigation

When firms' customers are located in geographically dispersed areas, it can be difficult to manage service quality because its relative importance is likely to vary spatially. This article shows how addressing such spatial aspects of satisfaction data can improve management's ability to implement programs aimed at enhancing service quality. Specifically, managers can identify areas of high service responsiveness, that is, areas in which overall satisfaction is low but customers are highly responsive to improvements in service quality. The authors estimate the spatial patterns using geographically weighted regression, a technique that accounts for spatial dependence in the variables. They apply this methodology to a large national sample of automobile customers served by a network of dealerships across the United States. The authors also investigate the extent to which factors related to the physical and psychological landscape explain the importance that people in different regions place on dealership service and vehicle quality.

Customer satisfaction is essential to the long-term success of a firm (Rust, Zahorik, and Keiningham 1995; Rust, Zeithaml, and Lemon 2000). However, especially at firms that provide services using a regionally dispersed network of outlets (e.g., automotive dealerships, bank branches), managers face several challenges in implementing a customer satisfaction strategy. For such geographically dispersed outlets, overall satisfaction and the importance placed on service quality will vary from region to region. The firm's ability to provide superior service may also vary geographically. As such, incorporation of the regional differences in customer satisfaction decisions is important.

This article illustrates an approach that enables a firm to identify regional patterns in satisfaction data using geographically weighted regression (GWR), a spatial-econometrics technique that has been used primarily outside of the marketing literature. We apply this approach to a data set of 164,085 customers who represent 21,636 five-digit zip codes across the United States. We identify locations where overall satisfaction is relatively low but where customers are highly responsive to improvements in service quality. Such identification can provide guidance in the implementation of a service strategy on a national basis.

Regional Differences in Consumption

Within marketing, the movement to understand regional differences in consumer consumption began in the 1970s. Responding to the fear that increasing mass production and mass communication would eliminate any regional differences among U.S. consumers, Wells and Reynolds (1979, p. 347) state:

> The homogenization hypothesis is not based upon conclusive evidence.... Even the arguments that support homogenization can be seen to work both ways. Consider the common-influences argument. There is ample evidence that the mass media do not have mass effects; rather, they have differing effects according to the predispositions of the audiences.... Perhaps we should expect a reinforcement of existing values and beliefs among regions, instead of a convergence.

These regional differences were documented in many descriptive studies (Gillin 1955; Glenn and Simmons 1967; Nicosia and Mayer 1976). In 1981, Hawkins, Roupe, and Coney proposed a framework for understanding regional differences in consumption. As is shown in Figure 1, they posit two sets of causative factors. Factors associated with the physical landscape directly influence the usage situations that consumers face, which in turn influence consumption patterns through homeostatic influences (Parker 1995; Parker and Tavassoli 2000). As the ovals in Figure 1 show, Parker (1995) suggests that climate affects consumer behavior through mediating mechanisms that are both physiological (e.g., homeostatic regulation in the hypothalamus) and psychological (e.g., optimal-stimulation level based on the different senses). This is consistent with research in biology and medicine (Anderson, Deuser, and DeNeve 1995; Hill 1992; London and Teague 1985; Spoont, Depue, and Kraus 1991). For example, differences in the degree of sunlight can affect the chemical balance in the brain, thus

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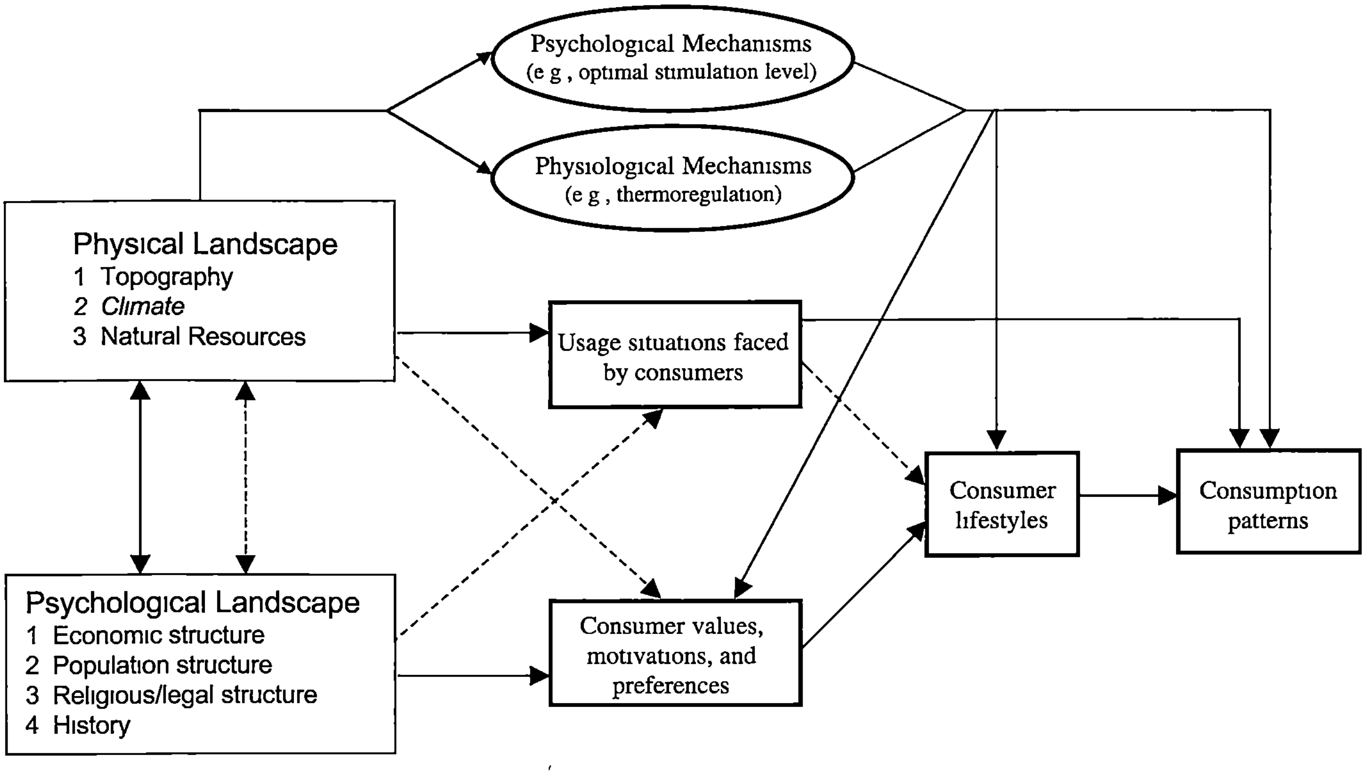
FIGURE 1
A Framework for Understanding Geographic Influences on Consumer Behavior



Notes Model components shown in rectangular boxes are adapted from the work of Hawkins, Roupe, and Coney (1981) Model components shown in italics and ovals are based on the work of Parker and Tavassoli (2000)

affecting customers' mood states and, in turn, customer satisfaction (Peterson and Wilson 1992) Factors associated with the psychological landscape can affect consumer values, motivations, and preferences, which in turn determine consumer lifestyles and consumption patterns In marketing, factors associated with the psychological landscape have received more attention (e g , Grewal et al 1999, Ingene 1984)

To implement the framework in Figure 1, the regional patterns must be empirically ascertained and the intervening mediators examined Both steps require data that represent large geographic regions This study focuses on the first step determining the spatial variation in overall customer satisfaction and its response to service provided by the firm

Empirical Research

Wells and Reynolds (1979) compare consumers from the eastern, southern, midwestern, southwestern, and western regions of the United States Hawkins, Roupe, and Coney (1981) compare coffee preparation and drinking habits in the same regions Similarly, Gentry and colleagues (1988) compare students from Wisconsin, Washington, Oklahoma, and Massachusetts to draw conclusions about regional variation All these studies find significant geographic variation in consumer values, attitudes, and consumption However, they all compare regions that were defined a priori

In contrast, recent works define regions on the basis of patterns embedded in the data themselves Ter Hofstede, Steenkamp, and Wedel (1999) analyze data from 11 European countries and find that segmentation in terms of consumer perceptions and attitudes does not overlap with the political boundaries of the countries In a more recent article, Ter Hofstede, Wedel, and Steenkamp (2002) develop a market segmentation model in which segment-membership probabilities for a focal region depend on the segment memberships of its immediately adjacent neighbors, thus enabling market segments to be spatially contiguous They apply this flexible segmentation model to a pan-European study of consumers who provided store-image ratings, and they find evidence of spatial dependence in segment membership Helsen, Jedidi, and DeSarbo (1993) show that countries classified as similar on the basis of macroeconomic variables may or may not exhibit similar patterns with respect to diffusion of consumer durable goods Hoch and colleagues (1995) and Bronnenberg and Mahajan (2001) incorporate heterogeneous geodemographic data and find that the location of consumers strongly affects their responses to prices and promotions However, these studies do not address issues related to customer satisfaction As such, it is not clear how regional differences should be addressed in an examination of customer satisfaction and its antecedents

Regional Patterns in Customer Satisfaction: Issues and Implications

In examinations of customer satisfaction data, differences have typically been incorporated at the customer level, though customer characteristics tend to explain less than 10% of the variation in overall satisfaction (Bolton 1998, Bryant and Cha 1996, Danaher 1998, Mittal and Kamakura 2001) The previous section suggests that it might be useful to examine differences across regions as well, especially because some relevant consumer characteristics may show systematic regional patterns For example, among automobile drivers, the relative emphasis placed on services may vary regionally not only because of the psychological landscape (e g , different customer characteristics) but also because of the physical landscape (e g , different climate and geography) In other words, we expect that regional differences exist, but in any large country such as the United States, the pattern of regional variability in overall satisfaction or the importance of service quality is not likely to map onto political boundaries or zones such as states or counties In such cases, what options are available to the firm for developing a service strategy?

An option is for the firm simply to ignore geographical patterns and to treat each service unit (e g , bank branch, dealership) as a separate entity Such a strategy, though conceptually appealing, may be practically infeasible First, it may not convey a unified brand image to a customer who patronizes different locations Differences in policies and procedures at the units can also confuse and irritate customers Second, such a strategy may be costly The firm may need to collect data for each individual service unit separately Although this can be done for the larger dealerships, obtaining a large sample from all the smaller service units not only may be costly but also may irritate customers who believe that they are oversurveyed and intruded on (Nunes and Kambil 2001) Third, this strategy may preclude a firm from benchmarking the service units against one another Another option is for the firm to ignore regional differences and to treat all service units exactly the same This strategy would fail to capitalize on geographic differences in the customer base Instead of this supply (firm) focus, we argue for differentiated strategies based on regional patterns in consumers' responsiveness to changes in satisfaction drivers

Such a strategy requires a firm to identify empirically the appropriate "region" in which customers' overall satisfaction is similarly responsive to improvements in service A reasonable strategy is to analyze smaller areas, such as the five-digit zip code, in which customers are more likely to be similar The smaller regions can be aggregated to produce meaningful regional zones in which consumers place a similar level of importance on service and have similar levels of overall satisfaction Identification of such regional zones in which overall satisfaction is highly responsive to service improvement can be difficult The firm may not know a priori the regional factors that drive such variability Even if such factors are known, they may be too numerous to model in a convenient framework, and/or data on many of the factors may simply be unavailable An empirical approach that can detect geographical patterns in the data without relying on explicit variables may be more useful Several techniques can be used to accomplish this objective For customer satisfaction data, GWR is particularly appropriate because of its versatility in addressing geographically sparse data (i e , when data may not be available for all the regions being analyzed) Typically, managers collect satisfaction surveys from customers who patronize different outlets (e g , dealerships, bank branches) Although such a strategy provides coverage of the entire service area, it does not provide data from each location (e g , five-digit zip code) The GWR technique is useful because it statistically "borrows" data for neighboring regions during estimation Next, we briefly discuss GWR and show its application in a customer satisfaction context Because the contribution of this article is not methodological, we do not address the debate about the various available approaches For this discussion, we refer the reader to the comprehensive review provided by LeSage (1999)

GWR and Customer Satisfaction

Brunsdon, Fotheringham, and Charlton (1996, 1998) developed GWR in the field of spatial econometrics Although it has not been applied in the marketing literature, GWR has been used in agriculture and environmental analysis (Nelson and Leclerc 2001), real estate (Fotheringham, Charlton, and Brunsdon 1999), education (Fotheringham, Charlton, and Brundson 2001), and political science (Calvo and Escolar 2002)

Brunsdon, Fotheringham, and Charlton (1996, p 285) describe how GWR is conceptually similar to kernel regression (Rust 1988) In each, the dependent variable (y) is modeled as a function of the predictors (x) by weighted regression, and weights for an observation are determined by the proximity of the focal observation and the neighboring observation The key difference is that in kernel regression, the weighting is done on the "attribute space" of the independent variables, whereas in GWR, it is done in the two-dimensional geographic space, thereby avoiding the well-known "curse of dimensionality" that affects kernel-density estimation methods Another important distinction is that in kernel regression, the dependent variable is related to predictors through a single, highly flexible, nonparametric relationship that applies to all observations or locations In contrast, GWR estimates a linear relationship between predictors and the dependent variable, and parameters vary across locations

The objective of GWR is to estimate a linear model that relates the dependent variable to its determinants after taking into account spatial correlation among observations in neighboring locations This is accomplished by allowing for spatial nonstationarity in the regression coefficients for each location A "location" is the geographic unit of analysis for which data may be aggregated For example, in the United States, the five-digit zip code is a location, which enables estimation of a regression coefficient for each location (i e , five-digit zip code) after accounting for the spatial correlation with neighboring zip codes The location is defined on the basis of factors such as data availability, similarity of customers within the location, cost effectiveness, and implementation considerations

Model Description

Consider the traditional linear regression model pooled across all locations $Y = X\beta + \varepsilon$ The objective of GWR is to use all the data available (on the dependent variable Y and predictors X, including a column for the intercept) across all locations to obtain location-level estimates of the regression coefficients Rather than pool all the available data, as in aggregate estimation, or shrink the regional estimates toward a population mean, as in random-coefficient models, GWR assumes that the regression coefficients vary across locations

The GWR technique takes advantage of spatial dependence in the data Spatial dependence implies that data available in locations near the focal location are more informative about the relationship between the independent and the dependent variables in the focal location When calculating estimates for a focal location, GWR gives more weight to data from closer locations than to data from more distant locations It is assumed that the relative weight of the contributing locations decays at an empirically determined rate as their distance from the focal location increases Statistically, spatial dependence is operationalized by a weighting scheme in a generalized least squares (GLS) model, such that locations closer to the focal one have a greater weight in determining the regression equation for the focal location The weighting matrix contains weights (w_j) for all locations that are used in computation of the regression equation for the focal location Using this geographic weighting matrix, we can obtain the weighted least squares estimates for any location j as follows

$$\hat{\beta}_j = (X'W_jX)^{-1}X'W_jy \tag{1}$$

This is a traditional regression estimated with GLS, where W_j is a $(n \times n)$ diagonal matrix that contains $\{w_{jj'}\}$, $(j' = 1,$ $, J)$ in the diagonal, defined by an exponential distance-based decay function,

$$w_{jj'} = \exp(-d^2_{jj'}/\theta), \tag{2}$$

where θ is the distance decay parameter, and $d_{jj'}$ is the Euclidean distance between locations j and j′

Implementation of the exponential distance-based decay function requires estimation of the optimal bandwidth (θ) before the weighted least squares estimates can be obtained The bandwidth parameter determines the relevance of each neighboring observation for the estimation of the regional-level parameters β When the bandwidth is sufficiently large, the GWR model reverts to a standard regression pooled across all regions We determine the most appropriate value of the bandwith using the least squares cross-validation procedure that Cleveland (1979) suggests Cross-validation basically relies on the following scoring function to determine the optimal value for θ

$$\sum_{j=1}^{n}\left[y_j - \hat{y}_{\neq j}(\theta)\right]^2, \tag{3}$$

where $\hat{y}_{\neq j}$ represents the fitted value of y with the observations from the focal location j omitted from the calibration process The value of θ that minimizes this score function is used as the bandwidth for calculating the weighting matrix Details about the estimation of GWR with cross-validated GLS are found in the work of Brunsdon, Fotheringham, and Charlton (1998)

The GWR model, as Brunsdon, Fotheringham, and Charlton (1998) propose, considers the case with only one observation per location However, in our analysis, we observe multiple responses in each zip code Rather than aggregate the data in each zip code, we estimate our model at the respondent level This individual-level estimation can be problematic because it emphasizes each location according to the number of observations in it Although this would be acceptable in the case of simple random or proportionate stratified sampling, it is likely to bias the estimates otherwise Therefore, we retain the concept of equal weighting for each location, as in the traditional GWR model, by weighting each observation with the inverse of the sample size in its location The altered GWR model can be represented as follows

$$\hat{\beta}_j = (X'W_ifX)^{-1}X'W_ify, \tag{4}$$

where f is a $(n \times n)$ diagonal matrix that contains the inverse of the sample size in the location j to which the individual observation i belongs, and the diagonal matrix W_i now contains the distance-based weights between each individual observation and the focal one (i) Note that the regression coefficients β_j are still defined at the location level, the estimates are the same for all observations in the same location This happens because all observations in the same focal location carry a unit weight, which results in the pooling of all observations from the same location

Although empirical comparisons between GWR and other approaches are found in the literature (e g , Brunsdon et al 1999, LeSage 2001, Wolfinger and Tobias 1998), it is important to compare GWR with three predominant methods spatial adaptive filtering (Foster and Gorr 1986), random-coefficients regression (Aitkin 1996), and multilevel modeling (Goldstein 1987) Spatial adaptive filtering incorporates spatial relationships in an ad hoc manner through exponential smoothing and produces nontestable parameter estimates, which limits its usefulness In the other two approaches, the parameter estimates of the regression model are assumed to be randomly distributed over the population of locations with either a finite (Wedel and Kamakura 2000) or a continuous mixture distribution (Aitkin 1996) Random-coefficients regression also requires repeated measures in each sampling unit for reliable estimates at the individual level, which are rarely available in geographic data For example, in the application we describe, most locations have only a single observation Multilevel modeling assumes that there is a hierarchical data structure with individual observations nested under another level, such as regions. However, both random-coefficients regression and multilevel modeling are silent about the nature of the spatial dependence in the data, a key factor in the determination of which locations should be treated similarly to constitute a region. Jones and Eldridge (1991) attempt a geographic variation of multilevel modeling, but they predefine a hierarchy of spatial units, which may not be appropriate for satisfaction data.

Rust and Donthu's (1995) two-step approach to capture geographically related misspecification errors in discrete-choice models is also closely related. In our situation, their approach would require us to estimate an aggregate regression model in the first stage and analyze the regression residuals in a second stage, using a cubic spline to relate the residuals to their geographic coordinates. The geographically related misspecification error captured by this approach would then be indistinguishable from the GWR intercept for each sampling unit. The GWR model we use herein allows for different geographic patterns for not only the intercept but also each response coefficient.

Ter Hofstede, Wedel, and Steenkamp (2002) take an entirely different approach. Rather than allow for a continuous spatial variation in the regression coefficients, they identify relatively homogeneous segments of regions under different assumptions about the spatial dependence among the segments. In its most strict form, their model requires spatial contiguity among segment members. In a less restrictive form, they assume only that the probability that a region belongs to a segment depends on the membership of its neighbor to the same segment. Rather than assume that there is spatial dependence among segments of regions, we account for spatial dependence in the original regions themselves.

When Should GWR Be Used?

The GWR technique should be used when there is spatial autocorrelation in the variables. High positive autocorrelation implies that values from neighboring areas are similar to one another, whereas high negative autocorrelation implies that values from neighboring regions are dissimilar to one another. The magnitude and direction of spatial autocorrelation for a variable can be quantified by means of two statistics: Moran's I and Geary's C (Cliff and Ord 1973, 1981). The computational details for each statistic are shown in the Appendix. As is shown in the Appendix, values of Moran's I that are greater than $-1/(N - 1)$ indicate positive autocorrelation, and vice versa. For Geary's C, values less than 1 indicate positive autocorrelation, and values greater than 1 indicate negative spatial autocorrelation. For both statistics, tests of statistical significance can be conducted to detect spatial autocorrelation. Based on these statistical significance tests, a decision to proceed with GWR can be made.

Research Setting and Data Description

We conducted the study for a domestic automotive manufacturer that sells and services its vehicles nationally in the United States through a dealership network. Although the manufacturer itself is responsible for the vehicle, it realizes the importance of dealership service as a key driver of overall satisfaction with the vehicle. Dealership service is particularly important during the later stages of vehicle ownership because it plays a significant role in the purchase decision of the next vehicle. Recognizing this, the company conducts a satisfaction survey with customers who have owned their vehicle for 33 months and who have had their vehicle serviced at an authorized dealership in the past 6 months. Thus, all respondents have a relatively high level of experience with the product (vehicle) and at least one service encounter at a dealership. Note that customers who took their vehicle in only for warranty- or recall-related service are excluded from the survey.

Data

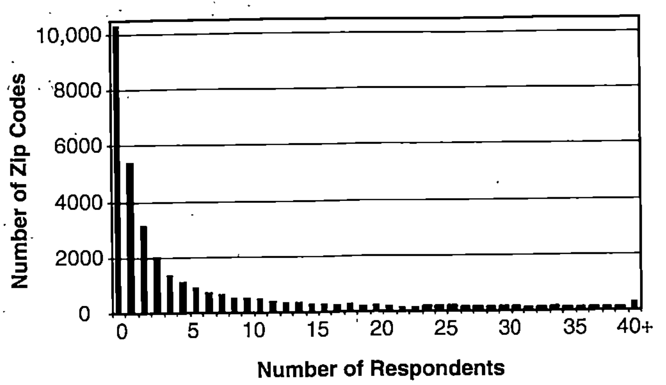
We used data from 164,085 customers who filled out the satisfaction survey. From this data set, we created a holdout sample by randomly selecting 32,000 customers from zip codes that contained at least 5 customers. Therefore, the reported analysis is based on 132,085 respondents, who represent a total of 21,636 five-digit zip codes in the United States. The sample is described in Table 1.

Of the 31,956 five-digit zip codes in the United States, we have data for only 21,636, or 67.7%. In other words, 32.3% of the zip codes have no data. Figure 2 displays the

TABLE 1
Sample Description

Sample Characteristics	Percentage
Sex	
Male	64.2
Female	35.8
Education Level	
High school or less	26.3
Some college	27.3
College graduate	46.5
Marital Status	
Married	76.0
Single	19.5
Other	4.5
Age	
Younger than 30 years	9.4
30–59 years	68.1
60 years or older	22.5
Overall Satisfaction Rating	
1	.9
2	.5
3	.9
4	2.1
5	2.8
6	8.7
7	9.4
8	25.4
9	18.5
10	30.7

FIGURE 2
Frequency of Respondents by Zip Code



Notes: Number of respondents = 164,085; respondents used in analysis = 132,085; total zip codes = 31,956; and zip codes with no observations = 10,320.

number of respondents from each zip code for whom data is available. In summary, a large proportion (32.3%) of zip codes are without data; among the remaining zip codes, more than half have five or fewer data points. A zip code–level analysis will systematically exclude approximately one-third of the zip codes. Among the remaining zip codes, zip code–level estimates may be unreliable for those that have five or fewer data points. More important, such an analysis will fail to incorporate the advantages of spatial autocorrelation in the estimation process. This is why the benefits of GWR make it the technique of choice for this problem: GWR statistically borrows observations from neighboring locations when estimating the coefficients for a focal location. This feature of GWR is useful because in most cases the focal location has few observations. In such cases, we obtain better estimates because observations from neighboring zip codes provide additional information. Borrowing from neighboring zip codes also helps identify regions that have similar coefficients, leading to a systematic view of the spatial patterns in the data.

Variables

We used data from three key variables that we measured using a ten-point scale (1 = "extremely dissatisfied," 10 = "extremely satisfied"). Each customer i answered the following questions on the ten-point scale: "On the basis of your experience this far, how would you rate your satisfaction with overall vehicle ownership experience (OVERALLSAT_i), vehicle quality (PRODQUAL_i), and dealership service (DLRSRV_i)?"

.Customers also indicated the five-digit zip code of their current residence. Although we could have aggregated zip codes up to a larger unit of analysis (e.g., county), we considered this inappropriate because it would imply homogeneity within relatively diverse areas. A finer unit of analysis such as the census block was not feasible because we defined the location of each respondent only by zip code. Thus, we performed a zip code–level analysis. We obtained the latitude and longitude coordinates for the centroid of each five-digit zip code. From the centroids, we computed the Euclidean distance between each zip code in the data set. We used this distance in the estimation of the GWR model.

Next, we estimated the spatial autocorrelation in the variables. In the absence of spatial autocorrelation, a pooled regression across all the areas should suffice. The measures of spatial autocorrelation (Geary's C and Moran's I) across all 21,636 zip codes for all three variables are shown in Table 2. Moran's I is greater than $-1/(N - 1)$ ($p < .05$), and Geary's C is less than 1 ($p < .05$). This indicates positive spatial autocorrelations for all three variables; values of observations from areas closer to one another tend to be positively correlated.

Results

Using GWR, we estimated the following relationship in which satisfaction with the ownership experience is a function of vehicle quality and dealership service:

$$\text{(5)} \qquad \text{OVERALLSAT}_i = \beta_{0j} + \beta_{1j}\text{PRODQUAL}_i + \beta_{2j}\,\text{DLRSRV}_i + e_i,$$

where e_i are i.i.d. normal disturbances. Note that we estimated the three parameters for each location j and observed disturbances at the individual i.

Using this model, the automotive firm can identify areas in which it should improve dealership service. For these areas, it can ascertain specific subdrivers of dealership service (Rust, Zeithaml, and Lemon 2000). The GWR model estimates separate coefficients for each five-digit zip code. A listing of coefficients for each location would be neither meaningful nor easy to communicate. Therefore, we depict the results in Figures 3 and 4 by plotting the regression coefficient for each location. In Figures 3 and 4, darker (lighter) color indicates a larger (smaller) regression coefficient (i.e., higher or lower importance) for dealership service and product quality.

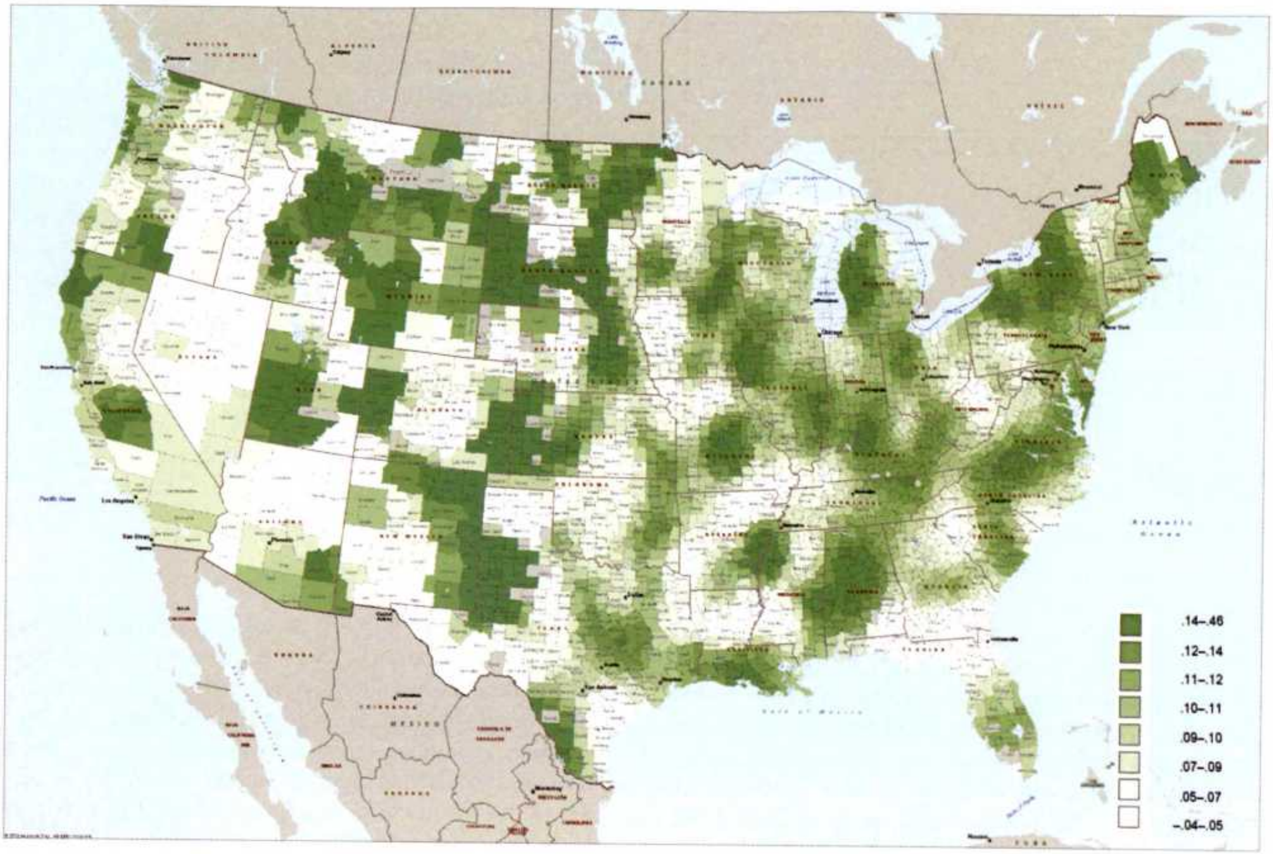
Regional Patterns in the Importance of Dealership Service

The regression coefficients for dealership service are depicted in Figure 3. Consider Colorado: In the southeastern part of Colorado, the importance of service quality is high (indicated by the dark color), whereas in the southwestern part of the state, it is lower (indicated by the lighter color). From central to northern Colorado, we find the lowest importance of service, indicated by the white shading. Furthermore, in the northeastern part of Colorado, the importance of service satisfaction is uniformly low, as it is in the adjacent state of Nebraska.

TABLE 2
Spatial Autocorrelation in Variables

	Moran's I	Geary's C
Overall satisfaction	–.008	.69
Dealership service	–.007	.76
Vehicle quality	–.007	.77

FIGURE 3
Coefficients for Importance of Dealership Services



In general, dealership service is more important in the easternmost or westernmost parts of the country, especially in parts of southern Oregon and northern California. Other regions in which service is important include northeastern New Mexico into Colorado and Kansas. In the Midwest, Kentucky, Indiana, and Illinois also share areas in which dealership service has high or medium importance. We were surprised that there is a large area in the western United States—including Nevada, Arizona, Oregon, and Idaho—in which dealership service is less important. In addition, the various major metropolitan areas are located in regions with different levels of importance. Indianapolis; Columbus, Ohio; and Philadelphia have high to medium importance of dealership service, whereas Jacksonville, Fla.; San Francisco; and San Jose, Calif., have medium to low importance.

Regional Patterns in the Importance of Vehicle Quality

Results for the importance of vehicle quality are shown in Figure 4. As we expected, they are essentially the inverse of the results for dealership service. Consider Texas: In northeastern Texas, we find that the importance of vehicle quality is relatively high in determining overall satisfaction. This part of Texas shares the pattern of high importance of vehicle quality with the neighboring states of Louisiana and Arkansas. However, between Dallas and Austin, the relative importance of vehicle quality is medium to low, as it is in northwestern Texas. In contrast, the importance of vehicle quality is high in southern Texas. The pattern of importance of vehicle quality also varies for different metropolitan markets. Whereas Philadelphia, New York, and Washington, D.C., are in areas of low importance, Memphis and San Francisco are in areas of high importance.

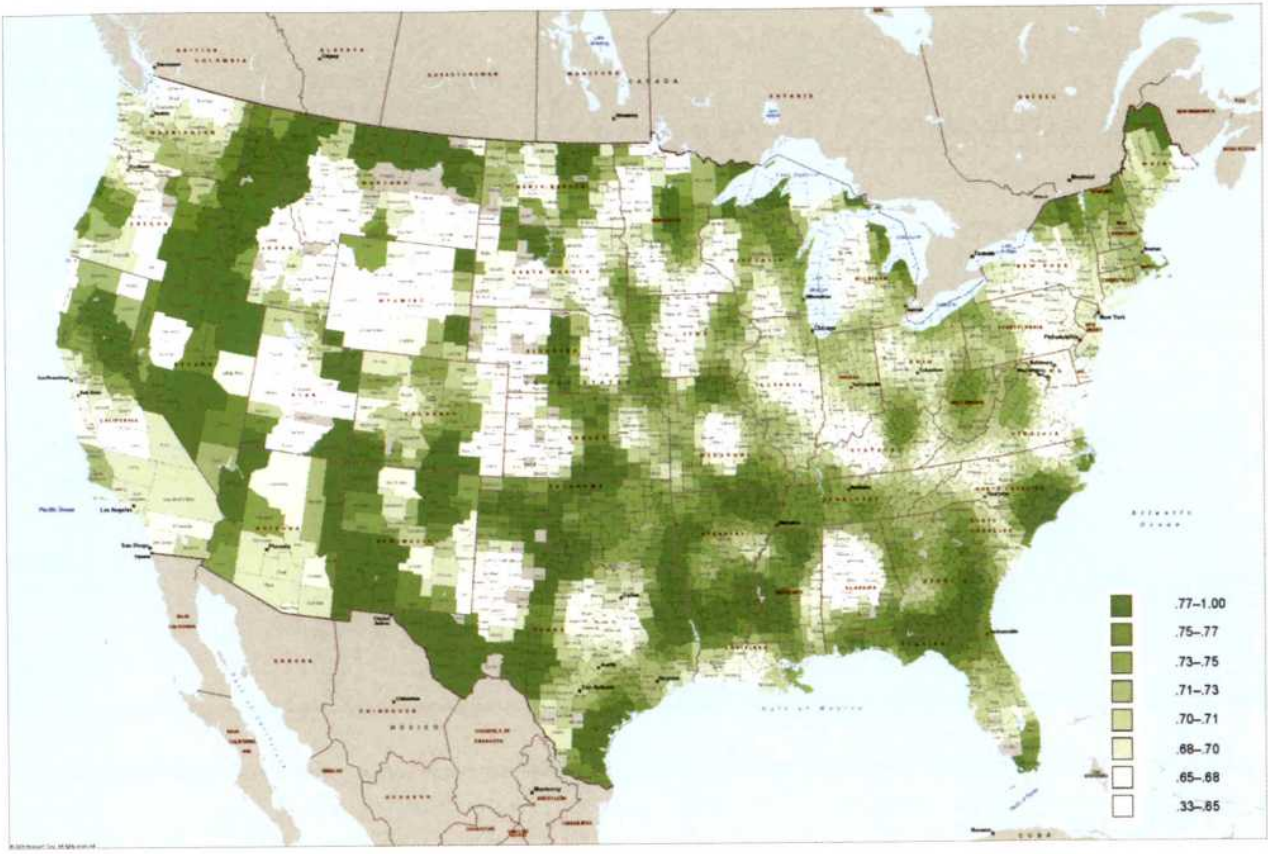
Model Performance

We evaluate model performance using two criteria: (1) the model's ability to predict overall satisfaction and (2) stability of the parameter estimates for the key drivers.

Predicting Overall Satisfaction

To evaluate predictive performance, we used the holdout sample created using 20% of the observations. To create the holdout sample, we selected zip codes that had more than five observations so that we could obtain standard regression estimates for each holdout zip code and so that at least two observations would be available for predictive tests. Note that the minimum of three observations for estimation is a requirement imposed by the benchmark models; GWR can compute the parameter estimates even in a zip code area that has no data, on the basis of data in neighboring areas. From the short-listed zip codes that contained five or more observations, we randomly drew 32,000 observations; a few

FIGURE 4
Coefficients for Importance of Vehicle Quality



zip codes had multiple observations in the holdout sample. The final holdout sample of 32,000 observations represents 13,846 zip codes.

Table 3 compares the GWR with simple regression using two measures of predictive performance. The first is the range of predicted satisfaction scores (from the 95% confidence interval) for each location, averaged across all locations in the holdout sample. We performed this using the prediction methodology that Nester (1996) and Brunsdon, Fotheringham, and Charlton (1998) suggest. This measure indicates the model's ability to predict the satisfaction scores on a zip code–level basis, and it indicates the uncertainty associated with the predictions. The second measure is the percentage of observations in the holdout sample for which the actual satisfaction score fell within the 95% confidence interval predicted by the model. This measure provides an empirical verification of the 95% confidence intervals across customers by showing the percentage of times the confidence interval included the actual satisfaction score in a holdout sample.

We examine the results at the zip code level. Model 1 uses GWR estimation at the five-digit zip code level. Model 2 is a zip code–level model without GWR that we estimated by running separate regressions within each zip code. Model 2 uses at least three observations within a zip code and compares predicted satisfaction scores with actual ones for the remaining observations in the zip code. The fourth column of Table 3 shows that the 95% confidence interval around the mean estimate of the predicted values is lower with the GWR model than with the model without GWR (.28 versus 1.07). Thus, the predictions we obtained with GWR carry a lower degree of uncertainty than do the predictions we obtained under the assumption that all regions are independent. The rightmost column of Table 3 shows that when GWR is used (Model 1), 87.05% of the observations in the holdout sample have a satisfaction score that falls within the 95% confidence interval of the predicted value. Without GWR (Model 2), only 40.42% of the values of overall satisfaction in the holdout sample fall within the 95% confidence interval of the predicted value. Therefore, the interval predictions that the GWR model produces are more likely to include the actual value even though the intervals are narrower, which reflects lower uncertainties about the predictions. The confidence intervals based on independent regressions were not only broader, reflecting higher estimation error, but also less accurate in predicting satisfaction in a holdout sample.

For comparison, we also estimated models at the county level (Model 3) and the state level (Model 4). As is shown in Table 3, the actual satisfaction score falls within the predicted 95% confidence interval for 72.56% of the predictions made with the county-level estimation and 83.58% with the state-level model. At first glance, the results appear to be comparable to those we obtained with zip code–level

TABLE 3
Model Validation Using a 20% Holdout Sample (Predictive Ability)

Model	Level of Analysis	Estimation Method	Range of Predicted Value Averaged Across All Areas[a]	Percentage of Observations in a 20% Holdout Sample Falling Within $\pm 1.96 (\sigma/\sqrt{n})$ of Predicted Value
1	Zip code (13,846)	GWR	.28	87.05
2	Zip code (13,846)	No GWR	1.07	40.42
3	County (n = 3102)	No GWR	2.39	72.56
4	State (n = 50)	No GWR	3.87	83.58
5	Random sample of zip codes (n = 17,228)	GWR	.62	71.41

[a] 95% confidence interval around the mean estimate.

TABLE 4
Mean and Standard Deviation of Split-Half Correlations (Parameter Stability)

	Correlation Between the Two Samples			
Parameter	Overall	Zip Codes with Observations	Data Missing in One Sample	Data Missing in Both Samples
Intercept	.61 (.02)	.66 (.04)	.41 (.04)	.41 (.08)
Dealership service	.62 (.04)	.68 (.06)	.41 (.05)	.41 (.07)
Product quality	.58 (.06)	.70 (.08)	.41 (.06)	.46 (.11)

estimation. However, note that the average range of predicted values for each area is much broader for the county-level model (2.39), and even more so for the state-level model (3.87), than for the zip code–level estimates. This means that it is more likely that the actual satisfaction score falls within the broader confidence interval. Because there is more uncertainty in the predictions at the county and state levels, the confidence intervals are much greater, which makes it is easier for the interval to contain the actual satisfaction score. Thus, for managers who want to ensure accurate prediction of overall satisfaction for each zip code under consideration, the zip code–level model with GWR performs the best.

Finally, we also performed a holdout test with another set of observations. In this case, we randomly drew 32,000 observations from the data set without limiting ourselves to the zip codes that had five or more observations. This sample of 32,000 data points represented 17,228 zip codes. We used the remaining 80% of the data to estimate a GWR model. We used the set of parameters we obtained from this model to predict the observations from the holdout sample. The results from this analysis are shown in the fifth row of Table 3. Note that the results from this prediction are not comparable to the estimates from ordinary least squares because for many of the zip codes involved, we had few observations left to be able to estimate an ordinary least squares model. The range of predicted values is now larger than when we included only zip codes with five or more observations (.62 versus .28). This is because we have many zip codes for which we have no observations in the focal region, and thus we needed to form predictions from neighboring locations through the GWR model. In addition, the number of observations that fall within $\pm 1.96(\sigma/\sqrt{n})$ was 71.41%, compared with 87.05% for the previous model. Nevertheless, this predictive performance is still superior to the benchmark models.

Stability of Parameter Estimates

To evaluate the stability of our estimates of the importance of dealership service and vehicle quality, we randomly split the sample within each zip code into two halves. When only one observation was available for a zip code, we randomly assigned it to one of the split samples, and it was designated as missing in the other sample. We then applied GWR on the two halves, computing the coefficients for the zip codes that had no data. To assess parameter stability, we computed the correlation from the two halves and for the complete data for the following three sets of zip codes: (1) ones for which the data were available in both samples, (2) ones for which the data were missing in one sample, and (3) ones for which the data were missing in both samples (i.e., we computed parameter estimates in both halves). We replicated the split-half test ten times, and we report the mean and standard deviation for the correlations across the ten replications. The split-half correlations, computed across 31,956 zip codes (including those with no data), provide an assessment of parameter stability for our application of the GWR model. When data were available in both split halves, the correlation was greater than .65. We consider this strong evidence of parameter stability because we computed the correlations between two estimates and across a large (31,956) sample size. When we impute the parameter estimate for one random sample (i.e., no data were available for the particular zip code), the correlation decreases to approximately .40. We expected this attenuation in the split-half correlations because the correlations now involve one parameter estimate and one imputed value. A notable result is that the split-half correlations were not further attenuated when both samples had imputed values (rightmost column of Table 4).

Regional Patterns in Dealership Service: Strategic Implementation

To implement the results, the firm should first identify regions in which overall satisfaction is relatively low. Then, among these regions, it can ascertain the responsiveness of overall satisfaction to dealership-service improvements. Then, the firm can give priority to the regions in which the importance of dealership service is relatively higher.

We selected the subpar satisfaction regions. For this study, we chose regions that were below the median in overall satisfaction. The regional pattern in overall satisfaction is shown in Figure 5. Thus, in these regions, there is relatively more room for customer satisfaction improvements. Note that the criterion and/or cutoff that is used to define subpar satisfaction regions is a subjective issue to be decided with managerial consultation. For the subpar satisfaction regions, we plotted the importance of dealership service (Figure 6). In Figure 6, regions with a darker shade are those in which the firm should implement service improvement first: They are regions in which such improvement has a relatively large impact on overall satisfaction and in which overall satisfaction is relatively low. In deciding where to invest in improving dealership service, the firm must also consider other factors such as market size and competition.

As a next step, performance on various attributes that drive dealership service should be measured. A key driver analysis can identify specific subdrivers of dealership service, and importance-performance charts can help the firm isolate the drivers that need improvement (Rust, Zahorik, and Keiningham 1995). The firm may also gather information on its customer base in such regions (e.g., the Southwest, southern Kansas) for further insights. That is, why is dealership service so important in such regions? Some of this could be related to structural factors and geographic conditions. Although the firm did not have primary data on these factors, we undertook such an exercise using secondary data, which we describe next.

Factors Determining Regional Variability in the Importance of Product and Service

Our goal is to determine empirically the extent to which different factors related to the physical and psychological landscapes affect the importance of the drivers of overall satisfaction. The national coverage of our data set provides

FIGURE 5
Overall Customer Satisfaction

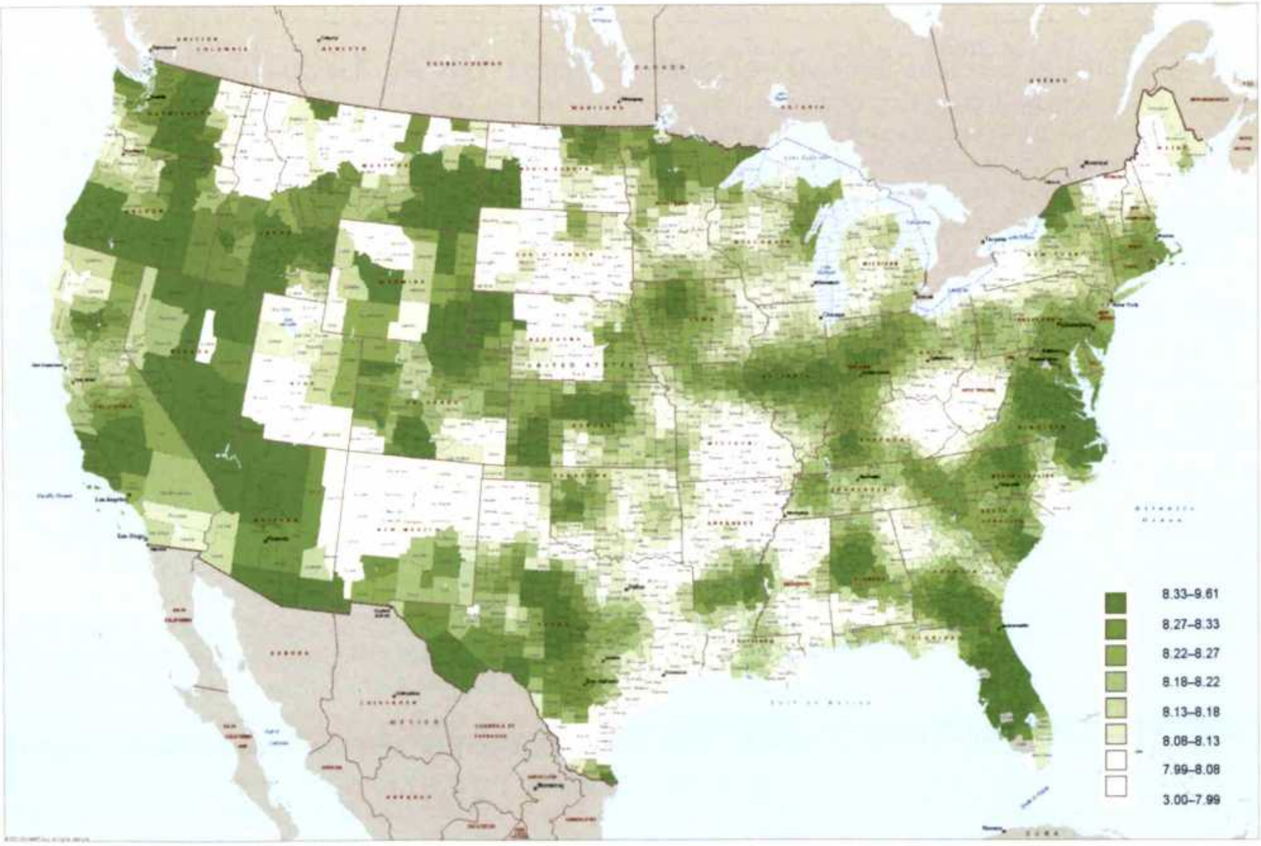
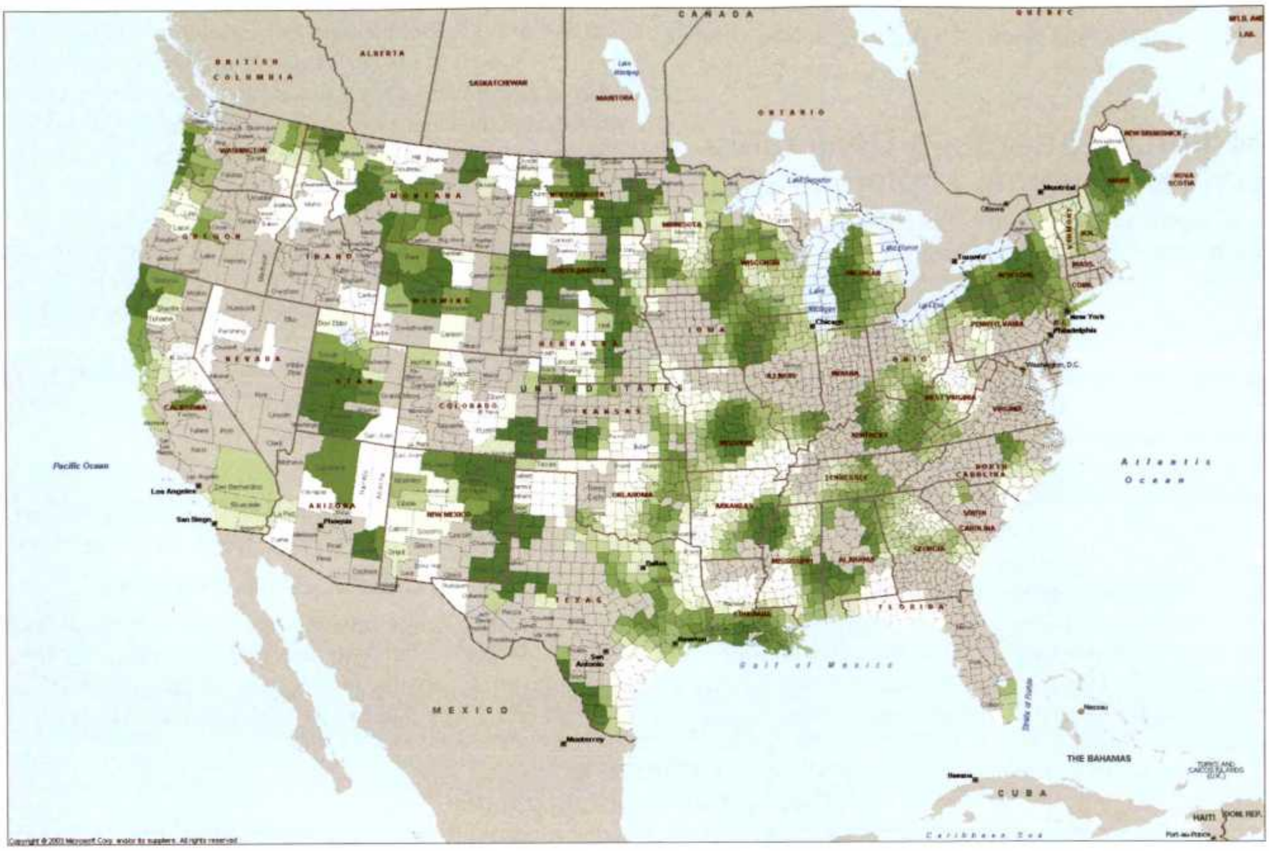


FIGURE 6
Service Responsiveness for Subpar Satisfaction Areas



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a unique opportunity to investigate this issue. To obtain measures of some of the factors, for each zip code we appended variables from the U.S. Census and the Weather Bureau. We included only variables for which data on at least 95% of the zip codes were available. We merged the variables with the survey measures and GWR results at the zip code level. Table 5 shows the variables we used in the final models.

Table 5 shows two models in which dependent variables are the importance of automobile quality and dealership service (as measured by the regression coefficients obtained from GWR). We did not use overall satisfaction because it has the product quality and dealership service embedded in it and is therefore driven more by supply-side factors (for which we do not have data) than by customer characteristics. In contrast, the importance coefficients measure how customers respond to the supply-side factors (product quality and dealership service) and are more intrinsic to the consumer. Thus, they are more likely to be affected by the physical and psychological landscape.

The regression coefficients in Table 5 have been standardized to make them directly comparable. We also tested the predictors for multicollinearity using the variance inflation factor, which was lower than 6, except for a few predictors that we excluded from the model.

Consistent with previous studies, we find that the importance of the automobile and dealership service varies on the basis of customer characteristics (e.g., Bolton 1998; Bryant and Cha 1996; Mittal and Kamakura 2001). In this regard, several notable patterns are evident. For example, as per capita income increases, the importance placed on the automobile ($\beta = .023$) and the dealership services ($\beta = .071$) increases. However, as the proportion of men in a region increases, the importance of dealership service declines ($\beta = -.031$), but the importance of the automobile increases ($\beta = .016$). This result is fully consistent with the work of Mittal and Kamakura (2001), who find that men place a lower importance on service than do women. Regarding age, younger buyers (age 25 or younger) place more importance on the automobile ($\beta = .117$) than on dealership service ($\beta = -.025$). In contrast, buyers older than age 60 place higher importance on both the automobile ($\beta = .062$) and the dealership service ($\beta = .090$). We found similar results for education. Within an area, as the proportion of people with less than ninth-grade education increases, so does the importance of the automobile ($\beta = .085$) and the dealership service ($\beta = .026$). However, among people who have a graduate degree, the importance of the automobile seems to be lower ($\beta = -.046$), but the importance of service seems to be higher ($\beta = .073$). Perhaps increased education and income make consumers more sensitive to service, though older consumers also attach higher importance to both the automobile and the dealership service. Driving habits and driving conditions also seem to influence the importance

TABLE 5
Determinants of Importance of Automobile Quality and Dealership Service

Independent Variables	Standardized Regression Coefficients: Importance of Automobile	Standardized Regression Coefficients: Importance of Dealership Service
Psychological Landscape Factors		
Per capita income	.023**	.071**
Sex (percentage of people who are male)	.016*	–.031**
Percentage of people who ...		
are younger than age 25	.117*	–.025**
are ages 26–35	.064**	–.010*
are ages 36–45	.042**	.020
are ages 46–60	.053**	.037*
are older than age 60	.062**	.090**
did not go to school	.017	–.076**
studied until less than ninth grade	.085**	.026**
have a high school diploma	–.069**	.072**
have an associate's degree	–.012	.028**
have a bachelor's degree	–.031**	.048**
have a graduate degree	–.046**	.073**
are Asian	–.039**	–.009
are American Indian	–.025*	–.016
are African American	–.047**	.052**
are Caucasian	–.031	.016
work in administration	.008	.017
work in managerial jobs	–.008	.049**
work as a laborer	–.081**	.028*
work in the farming sector	–.051*	.131**
work as a technician	.005	–.044**
carpool	.077**	–.124**
use public transportation	–.041**	–.031**
drive less than 20 minutes to work	–.056**	–.002
drive 20–30 minutes to work	–.009	.011
drive 31–90 minutes to work	.016*	–.080**
drive for more than 90 minutes to work	–.020**	–.031**
Physical Landscape Factors		
Elevation	.016	–.017
Mean minimum temperature	.012	.002
Mean rain	.015	.085**
Mean snow	.171**	.091**
Mean maximum temperature	.056**	–.039**
Variance in minimum temperature	.074**	.068**
Variance in rain	–.016	–.012
Variance in snow	.156**	–.067**
Variance in maximum temperature	–.016	–.053**
N	27,584	27,584
R^2	6.18%	8.71%

*$p < .05$.
**$p < .01$.

placed on the automobile and the dealership service. As we expected, as the proportion of carpooling consumers increases, the importance of the automobile increases ($\beta = .077$), but the importance of dealership service decreases ($\beta = -.124$). The importance of the automobile and dealership service decreases ($\beta = -.041$ and $-.031$, respectively) as the proportion of people who use public transportation in an area increases. Perhaps in such areas alternative means of transportation assume higher importance.

Factors that constitute the physical landscape are also related to the importance placed on vehicle and dealership service, though the pattern of results is complex. Elevation is statistically not significant ($p > .05$). The mean amount of snow increases the importance placed not only on the vehicle ($\beta = .171$) but also on the service ($\beta = .091$). The variance in the amount of snowfall has a different effect; it increases (as we expected) the importance of the vehicle ($\beta = .156$) but decreases the importance of dealership service ($\beta = -.067$). The mean amount of rainfall affects only the importance placed on service, whereas the variance in rain has no impact. The mean maximum temperature increases the importance placed on the vehicle ($\beta = .056$)

but decreases the importance placed on the dealership service ($\beta = .039$). Higher variance in weather conditions (e.g., rain, snow, maximum temperature) has no effect or a positive effect on the importance of the vehicle but almost always decreases the importance placed on the service element. In other words, in areas with highly varied climate, consumers seem to be more concerned about the vehicle than the dealer service. However, areas in which the mean amount of snow and rain is generally high deserve special attention because both service and product elements are important.

In summary, factors associated with the psychological and physical landscape are statistically associated with the importance of dealership service and vehicle quality, though the nature of the association is rather complex. Consistent with previous studies (Bryant and Cha 1996; Mittal and Kamakura 2001), we find that though customer demographics are statistically significant, they have low power ($R^2 <$ 9%) in explaining the importance of satisfaction drivers. Empirically, this provides additional evidence for the robustness of using a GWR methodology that obviates the need for explicit inclusion of the variables in a model a priori. In other words, a strategy for explicit inclusion of the variables in a model that predicts overall satisfaction is unlikely to be useful, and potentially biasing, if the model does not account for heterogeneity across regions beyond these observable characteristics.[1] The results also indicate the need to improve the understanding of marketing phenomena with respect to the framework shown in Figure 1. Specifically, the mediating constructs (usage situations, homeostatic mechanisms, and consumer values) are not explicitly incorporated in our analysis. We believe that it is this lack of mediating mechanisms that may lead to the low observed explanatory power and that should be addressed in further research.

Discussion

Based on GWR, our results (for a firm in the automotive industry) show the following:

- There is systematic spatial variability in the pattern of overall satisfaction and the importance placed on its key drivers. Although the specific pattern of regional variation is likely to differ on the basis of the category investigated, the presence of systematic spatial variability should be incorporated in further investigations of satisfaction data.
- Explicit inclusion of physical and psychological factors explains less than 9% of the variability in the importance of key drivers. This may be because we did not explicitly incorporate specific mediating mechanisms into the response model.
- The regional differences in the importance of key drivers and the overall satisfaction patterns enable a firm to identify regions in which it should improve service. The firm can prioritize regions to make investments in improving dealership service.

Two decades ago, Wells and Reynolds (1979, p. 347) asked: "If, then, regionalism is persistent, the substantive question is the nature of the regions. How do regions differ in life styles, in consumption-related variables? How are they similar?" Our results demonstrate that the nature of the regions and regional differences is unlikely to map onto political boundaries or other impressionistic characterizations based on regional stereotyping (Wells and Reynolds 1979). Firms should take a data-based view of regional differences to improve their decisions.

For identifying the appropriate regions, our results suggest that a strategy of explicitly including demographic and geographic factors in the model may not provide as good a picture as the one produced with GWR. Even with a large set of predictors, less than 9% of the variance in the importance of the automobile and dealership service could be explained. From a practical standpoint, a firm's generating such an exhaustive set of predictors and obtaining information on them could prove cost prohibitive. Furthermore, information at the desired level of granularity simply may not be available, thus leading to higher numbers of missing observations. By obviating the need for collecting such variables, GWR can be used to address such issues more easily. Other empirical approaches may prove equally useful.

Moving forward, it will be important to identify and incorporate mediating factors in the analysis. When we attempted to directly relate regional characteristics (physical and psychological) to the importance placed on service and product, the explained variance was low despite the large number of regional characteristics we included in the analysis. We believe that this happened because we did not incorporate specific mediators, such as usage situations, and consumer motivations and values (see Figure 1) in the analysis. Incorporation of these mediators should not only increase the explanatory power of the models but also improve theorizing by examining how regional characteristics influence distal outcomes such as consumer judgments.

Many scholars have argued that implementation of an appropriate service strategy must account for customer differences (Bolton and Drew 1994). However, prior work has been limited to accounting differences based only on customer demographics (Mittal and Kamakura 2001; Peterson and Wilson 1992) or industry characteristics (Anderson, Fornell, and Rust 1997). Some studies also show that satisfaction ratings and the importance of key drivers can vary over time (Mittal, Kumar, and Tsiros 1999). We show that in addition to the consumer, industry, and time, the geographic location in which ratings are obtained is important. There is a need to develop theory and analytic models that can simultaneously examine all these sources of variation, additively and interactively, to explain customer satisfaction. For example, how do geographic patterns in satisfaction data change over time, and what role do changing demographic patterns play in the observed patterns? Large-scale data (spanning a wide geographic region) with a longitudinal design are needed to answer such questions.

This research can help in the design of satisfaction measurement programs after accounting for regional differences. First, even in the comprehensive and large database we used, data were missing from nearly one-third of the zip codes because the sampling methodology was not designed to obtain the type of data that may address regional issues Sampling strategies that can provide geographic coverage with limited resources are needed Second, firms should carefully consider the geographic unit of analysis Although we used the five-digit zip code as the unit of analysis, this made the data collection task more daunting A larger unit of analysis (e g , county) could reduce the data collection burden, but it may result in loss of data resolution Striking a balance is an important issue for firms The level at which the firm implements the results is a key deciding factor Finally, qualitative research is needed to delineate why customer satisfaction and its responsiveness to antecedent variables varies regionally This should help identify the mediators that link geographic conditions to customer behaviors

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[1] It can be argued that the two-stage approach we use herein, though it produces unbiased estimates, may be less statistically efficient. However, given the large sample sizes involved, efficiency should not be a reason for concern.

Although the statistically significant impact of weather conditions on the importance of product quality and dealership service is small, it deserves more attention Peterson and Wilson (1992) mention the relationship, but we are not aware of any large-scale empirical tests of this "taken-for-granted" relationship It would be especially useful to test competing mediating mechanisms, such as mood and arousal, by which weather conditions might influence consumer judgments, especially for categories with a seasonal component Our results imply that the mechanisms are not as straightforward as has been believed For example, we found variance in weather conditions to affect the importance placed on service and product In this respect, the homeostatic approach that Parker (1995) and Parker and Tavassoli (2000) advocate seems to account for the pattern observed in the data

Finally, many methodological challenges need to be addressed Customer satisfaction data have unique characteristics, such as skewed distributions and high multicollinearity, that make applications of standard spatial models problematic Different methods should be compared in order to develop guidelines about the conditions in which one class of models may be more appropriate than another Another important area of research concerns the development of spatial models that can accommodate consumer choice and multiequation systems (Bolton and Drew 1994) Many aspects of the GWR could be improved as well For example, the assumption of a homogeneous decay parameter for model estimation could be relaxed

The limitations of our data also deserve attention Although the results are specific to the automotive industry, the insights developed herein should be universally applicable in several other industries, such as pharmaceuticals, home building, and consumer perishables As consumers become more mobile, it will become even more important to address the spatial aspects of data This no doubt will surface new and interesting challenges—theoretical, empirical, and managerial ones that should provide the impetus for further research in this area

Appendix

Moran's I

We calculated Moran's I using the following formula

$$\text{(A1)}\qquad I = \frac{N}{S_0}\,\frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w(i,j)(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{N}(x_i - \bar{x})^2},\; j \neq i,$$

where $S_0 = \Sigma_{i=1}^{N}\Sigma_{j=1}^{N} w(i, j)$, and $w(i, j)$ is the weight given to region i for focal region j The expected value of Moran's I is $-1/(N - 1)$ Values of I that exceed $-1/(N - 1)$ indicate positive spatial autocorrelation In positive spatial autocorrelation, similar values (either high or low) are spatially clustered Values of I that are less than $-1/(N - 1)$ indicate negative spatial autocorrelation (values from neighboring regions are dissimilar), whereas values greater than $-1/(N - 1)$ indicate positive spatial autocorrelation (values from neighboring regions are similar)

Geary's C

We obtained Geary's C using the following formula

$$\text{(A2)}\qquad c = \frac{(N-1)}{2S_0}\,\frac{\sum_{i=1}^{N}\sum_{j=1}^{N} w(i,j)(x_i - x_j)^2}{\sum_{i=1}^{N}(x_i - \bar{x})^2},\; j \neq i$$

The theoretical expected value for Geary's C is 1 A value less than 1 indicates positive spatial autocorrelation, and a value greater than 1 indicates negative spatial autocorrelation

For our analysis, we constructed the weighting matrix for the two indexes using the physically adjacent neighbors as regions that influenced the focal region We identified the immediate physical neighbors using Delauney triangulation (LeSage 1998)

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Das Narayandas & V. Kasturi Rangan

Building and Sustaining Buyer–Seller Relationships in Mature Industrial Markets

Empirical research in relationship management has tended to take a snapshot of a relationship at a given time and attempt to project its trajectory, despite agreement among researchers that a longitudinal perspective focused on process models advances the implications for practice The authors use a field investigative approach to study, over time, the evolution of three industrial buyer–seller relationships in mature industrial markets The relationships are characterized by various degrees of initial asymmetry and have evolved in dramatically different ways over time Their findings suggest that weaker firms can structure and thrive in long-term relationships with powerful partners because initial asymmetries are subsequently redressed through the development of high levels of interpersonal trust across the dyad, which in turn leads to increased levels of interorganizational commitment

A move in industrial markets from adversarial relationships focused on a single exchange to collaborative partnerships focused on building long-term relationships through nonmarket modes of governance has been documented in business publications since the late 1980s (e g , Davis 1989, Emshwiller 1991) Among the benefits advanced for such relationships are reduced transaction costs, enhanced productivity, and higher economic returns for customers and suppliers (Kalwani and Narayandas 1995, Noordewier, John, and Nevin 1990) However, not all relationships yield mutually beneficial outcomes Firms at times have behaved opportunistically in such situations to accrue greater benefits for themselves at the expense of their partners For example, not long ago, the vice president of worldwide purchasing for General Motors, José Ignacio Lopez de Arriortua, used the company's power to void written contracts with suppliers and to reopen bidding with demands for price cuts of an additional 20% (Webster 1995)

In the academic literature, relationship marketing has been characterized as a fundamental reshaping of the marketing field (Webster 1992) and as a paradigm shift that deserves new theory and language (e g , Anderson, Håkansson, and Johanson 1994, Nevin 1995, Sheth and Parvatiyar 1995) Despite the enthusiastic attention to the importance of relationship marketing, other than the pioneering field-based research of relationship evolution by the International Marketing and Purchasing (IMP) group (e g , Ford 1990, Håkansson 1982, Håkansson and Wootz 1979), there is little empirical research in business marketing that informs academics and practitioners of the process through which industrial buyer–seller relationships evolve over time (Wilson 1995) This gap has prompted researchers such as Anderson (1995), Jap and Ganesan (2000), and Lambe, Wittmann, and Spekman (2001) to call for more field-based research that involves longitudinal case studies that draw on material from the multiple exchange episodes that constitute relationships and that offers insights into the process of relationship initiation and maintenance

In this article, we attempt to fill this important void by investigating how buyer–seller relationships are initiated, built, and nurtured in mature industrial markets and why and how they succeed or fail Using field research from three industrial buyer–seller settings, we derive a set of propositions that explains and integrates existing knowledge about buyer–seller relationship formation and advances the understanding of how the relationships evolve over time Our contribution is in the spirit of theory construction from grounded field observations

In the next section, we offer some background on gaps that we perceive in the relevant literature We then describe our methodology, discuss the field research data, and distill our inferences in the form of four propositions In the closing section, we elaborate on five processes that explain how industrial buyer–seller relationships are initiated, maintained, and established in mature markets

Gaps in the Literature

The marketing literature is replete with perspectives that shed light on the underlying characteristics of buyer–seller relationships For example, the theory of power (Emerson 1962) has been adapted by several marketing scholars to explain relationship initiation and maintenance (e g , Frazier 1983, Reve and Stern 1979) Transaction cost theory (Williamson 1975, 1985), with its emphasis on efficiency, has been invoked to explain the nature of governance in

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interfirm relationships (Heide 1994, Heide and John 1992), relational contract theory (MacNeil 1980) to interpret the spectrum of governance structures that characterize industrial buyer–seller relationships (e g , Dwyer, Schurr, and Oh 1987, Lusch and Brown 1996), and social exchange theory (Blau 1968, Ekeh 1974, Homans 1958, Thibaut and Kelley 1959) to explain the process of relationship development and maintenance (e g , Lambe, Wittmann, and Spekman 2001) Although each of these theoretical perspectives has spawned impressive research streams in marketing that are variously focused on the input and desired output of relationships, marketing researchers have been frustrated in their attempts to use any single theory to explain the evolution of interfirm relationships in industrial markets from initiation to maintenance Consequently, scholars have been forced to crisscross paradigms, particularly scholars who invoke the power paradigm to acknowledge its consequences for trust and commitment among relationship partners and scholars who work with social exchange theory concepts to acknowledge the role of power in creating environments in which relationships flourish or perish Such efforts notwithstanding, a set of curious "process" gaps persists in the literature Many important pieces of research reported in the marketing literature have identified the different constructs that characterize the relationship at its different stages but offer limited insight into the transition from one stage to another

For example, Jap and Ganesan (2000) investigate supplier–retailer relationships in each of five stages, as defined by Dwyer, Schurr, and Oh (1987) Using a cross-sectional survey design, Jap and Ganesan find systematic variance in the interrelationships among state variables across the different relationship phases, as proposed by Wilson (1995) For example, they find that the use of relational norms moderates the effect of a retailer's investments on supplier commitment in the relationship buildup and decline stages but not in the maturity stage However, because of the cross-sectional nature of their design, Jap and Ganesan refrain from offering inferences on longitudinal transition

The literature is also mixed on how initial power positions play out in long-term relationships Several researchers have concluded that asymmetrical power and dependence structures result in dysfunctional relationships (Gundlach and Cadotte 1994, McAlister, Bazerman, and Fader 1986) Others have suggested economic (Bucklin 1966), political (Stern and Reve 1980), and sociopsychological (Anand and Stern 1985) reasons that channel members with "authority" might relinquish channel control More recent research has highlighted conditions in which mutually trusting and committed relationships might be developed in the absence of a balance of power between two parties For example, Kumar, Scheer, and Steenkamp (1995b) find that even in the presence of power and dependence asymmetries, firms engage in relational exchange as long as the weaker firm perceives the more powerful firm as fair Similarly, Kumar, Scheer, and Steenkamp (1995a) find that interdependence asymmetry leads to conflict but that the effect is countered by an increase in total interdependence These are useful inferences, and they provide justification for the weaker partner to seek a business relationship However, still missing is the process through which transformation can occur, that is, the rationale for the powerful party behaving fairly in an asymmetrical relationship It would also be useful to identify the process whereby interdependence is increased in relationships characterized by initial asymmetries

Transaction cost theory's premise that universal partner opportunism limits the effectiveness of relational governance has been shown to be untrue by researchers who have found that relational controls are effective governance mechanisms (Anderson and Narus 1984, 1990, Heide and John 1992, Morgan and Hunt 1994) Yet there is no empirical evidence of a process that explains the formation of such relational controls in industrial markets over time, especially if they did not exist at the outset Relational contract theory, though helpful in categorizing relationships, provides little insight into the transformation elements that facilitate migration from a transactional to a relationship mode over time

Notwithstanding a few pioneering attempts to focus on the nature of relationship building and the changing dynamics of relationships over time, important voids persist, which is a consequence of the cross-sectional designs used in most empirical work in relationship management to date Such studies can only suggest preconditions for the formation of interfirm relationships and the underlying factors responsible for a healthy/unhealthy dynamic Because industrial buyer–seller relationships develop episodically, deeper insights into the evolution of such relationships must rely on a longitudinal approach and concomitant time and effort to collect field data This is why Lambe, Wittmann, and Spekman (2001), even as they call for such investigations, acknowledge (as do Anderson [1995] and Wilson [1995]) that this is a daunting task for researchers who live in a "publish-or-perish" world

Research Method

Given our objective of understanding the evolution of relationships, and consistent with a call for studies that explore the temporal dimension of relationships, we used a clinical field research methodology to observe the phenomenon and to collect data (Bonoma 1985, Van Maanen 1979) Such a methodology is appropriate for the exploration of new phenomena or little-understood aspects of known phenomena (Bonoma 1985) We recognize that the small number of observations, and therefore the lack of statistical validity, makes such a methodology more credible in theory construction than in theory testing (Eisenhardt 1989, Rangan, Corey, and Cespedes 1993)

Clinical field research calls for a purposive rather than random sampling design (Argyris 1990) Our interest in understanding processes that support relationship development prompted our focus on the component parts and industrial supplies (rather than capital equipment) value chain Relationships in this value chain exhibit several unique characteristics that inform our study First, because such markets are mature with competitors that are able to offer equivalent products at competitive prices (Spekman 1988), suppliers tend to focus on relationship management rather than product technology (Rangan, Moriarty, and Swartz 1992) Second, customers use the products and services repetitively in production or maintenance processes, which prompts continuous rather than limited and infrequent interaction (Noordewier, John, and Nevin 1990) and thus affords attendant opportunities for participants to initiate and manage relationship changes Finally, operating risk, or the risk that a supplier will fail to deliver (Wilson 1995), is reduced for buyers that can potentially source the same component from multiple suppliers, which allows for the existence of a spectrum of buyer–seller dyad types, from purely transactional to long-term relationships

The Appendix describes three dyads involved in the selling and buying of frequently purchased intermediate components in mature markets Each dyad not only fits the sample selection criteria laid out but also exhibits variations in important constructs that are critical to our inquiry For example, in terms of size, in the first dyad, the vendor (General Electric [GE]) seemed to be much more powerful than its master distributor (RCI), whereas in the second dyad, the vendor (Peak Electronics) seemed to be much weaker than the original equipment manufacturer (OEM) buyer (Ford) In the third dyad, Alpha Tires and Delta Mines (disguised names) seemed to be equally powerful Across the dyads, products varied from maintenance, repair, and operations components (GE–RCI refrigeration and air-conditioning components) to production components (Ford–Peak printed circuit boards [PCBs], Alpha–Delta earthmoving tires) and from low-ticket items (GE–RCI and Ford–Peak) to big-ticket purchases (Alpha–Delta)

Theory-construction research requires that researchers "trap" the phenomena of most interest for closer scrutiny (Argyris and Schon 1974, Glaser and Strauss 1967, Zaltman, LeMasters, and Heffring 1982) while still providing openings for alternative causal variables to emerge (McCracken 1988, Zaltman 1997) We approached the study from the perspective of the gaps we had identified in the literature Recognizing that relationships have beginnings, we were interested in the nature of interfirm interactions at the outset and the process of relationship initiation Next, we focused on individual episodes and their impact on the evolution of a relationship Finally, we sought to identify key change points that might have affected the course of a relationship over time On average, we spent six interview days at each dyad (roughly three on each side) and talked to anywhere from 5 managers (at GE–RCI) to 18 managers (at Alpha–Delta) This number does not include the managers we observed at in-company meetings as part of the research process Because of scheduling considerations and our need to absorb and understand the data, we staged the site visits and the research at each dyad over approximately one year Because we did not investigate the three dyads simultaneously, the overall data collection process lasted more than two and a half years Our study covered five broad areas of inquiry

1 Conditions in which the relationship was initiated,
2 Initial terms and conditions of the contract or agreement,
3 Changing nature of interaction between the two firms (i e , the actions taken by each and evaluation of the actions by the other),
4 Changes over time in each side's orientation to the relationship, associated expectations, and perceptions of outcomes, and
5 Subsequent changes to the initial terms and conditions of the contract or agreement

The interview sequence began with a focus on the existing agreement between the two parties and an attempt to identify its scope and antecedents We posed the five broad areas of inquiry in the reverse order as shown previously Because each question was a broad entrée to an in-depth inquiry, not all interviews provided complete coverage of all questions That some questions were answered more elaborately than others reflected the knowledge of the relevant manager To minimize interviewer bias and to broaden the inquiry beyond what was suggested by our preconceived frame, we asked for open-ended responses to questions about causal linkages and key transition points in the relationship (McCracken 1988, Zaltman 1997) It can be argued that such an approach emphasizes managers' subjective interpretations of events over the underlying objective data, but the managers we interviewed also were key decision makers, and thus it was their perceptions that ultimately counted Moreover, industrial marketing researchers have used such interpretive data analysis (Flint, Woodruff, and Gardial 2002, Workman 1993)

Field Research Findings

We present our field data and interpretations thereof along a longitudinal dimension that captures the highlights of each dyad's evolution We conclude our discussion by reconciling our field data with potential theoretical explanations and by considering how it extends extant theory

Relationship Initiation and Initial Governance Structure

Table 1 provides a detailed description of the initial power positions of the two firms in each dyad Because few suppliers in the 1960s were capable of manufacturing the quality and range of electrical components used in products manufactured by GE's various divisions, the prevailing channel pattern was for component manufacturers to route products to OEMs for original equipment and for subsequent repair For example, if a Carrier air-conditioning system failed, repair and replacement of any GE parts and components would be exclusively accommodated by Carrier's distribution channel arrangements In the prevailing system, independent contractors could not source GE repair parts However, RCI was attempting to bridge this gap by selling repair parts to non-Carrier distribution outlets that would then make them available to independent contractors Thus, GE brought technology, products, and brand power to the relationship, whereas RCI, having not yet developed the aftermarket networks, could promise only market access At the outset, no formal contract was established between the two parties Danny Schwartz, the chief executive officer of RCI, summarized the situation as follows

> My father knew that setting up the aftermarket channel would mean a lot of investments that RCI had to make It was clear to him that the deal was a nonstarter if GE did

TABLE 1
Initial Power Positions

Dyad	Description
GE–RCI	RCI's founder, Mark Schwartz, sought the relationship with GE. He offered to open the aftermarket channel route for GE, which had until then focused on OEM sales. Absent the support of GE, on which it was totally dependent for products, RCI would have been in no position to execute its distribution plan. Because it was quite busy supplying large OEM customers, GE did not need RCI; moreover, at the time, RCI was only a small entrepreneurial start-up with no significant revenue. GE was the more powerful partner.
Ford–Peak	Wanting to outsource its PCB requirements, Ford's electronics division, in keeping with the company's policy of expanding support for minority suppliers, approached the minority business owner Earl Yancy, a highly rated supplier of coal to the company. Yancy was seeking an opportunity to offset the cyclical nature of his commodity coal business with an entry into value-added manufacturing, but he lacked both technical expertise and market access. Ford provided both and was more powerful than Yancy's PCB supply firm (Peak Electronics).
Alpha Tires–Delta Mines	Alpha Tires was one of three suppliers to Delta Mines. The largest mining customer in North America, Delta accounted for nearly 30% of industry purchases of earthmoving tires, with an estimated value of $100 million. Whereas both Alpha and Delta possessed size and wherewithal, it was the former that sought a strategic supplier relationship with the latter. Alpha needed Delta's tire volume to enhance use of its new $500 million U.S. manufacturing facility. Rebounding from a recent poor experience with its preferred supplier Beta Tires, Delta viewed Alpha's willingness to develop customized solutions as a favorable, positive step. The power structure seemed to be slightly skewed in Delta's favor.

> not let him sell their products in this channel. Realizing that he was not in a position to demand any concessions, he went ahead based on the verbal commitment he received from GE managers. As I look back, at that point, there was no basis for him to expect that GE would keep its end of the bargain. Yet he plunged into the relationship with literally no safety net; he had no choice.

In the Ford–Peak relationship, when encouraged by Ford managers to select and prequalify a manufacturing site in anticipation of becoming a Ford supplier, Peak's founder, Early Yancy, refused to move forward without several concessions from the automaker:

> Ford wanted me to acquire a plant for manufacturing PCBs, but they were already buying such components from other suppliers. I therefore asked Ford to give us subsidy payments to achieve parity in production efficiency with their incumbent suppliers. We also needed some commitment on purchase volumes before we could reasonably make an investment.

Ford managers, believing that their supplier sponsorship program was clear and fairly generous, had expected a quick, relatively simple negotiation process. However, Yancy, who believed that he needed to achieve parity in production efficiency with incumbent suppliers, had entered the negotiations with a focus on Peak's expected competition and risks. The final agreement required Ford managers to provide detailed specifications and volume commitments for parts made by Peak over a period of three years. In return, Peak was obligated to meet a time line and quality and cost targets established by Ford. To help Peak offset setup costs and achieve profitability as quickly as possible, Ford agreed to provide a $2.9 million subsidy over three years. For its part, Peak was expected (1) to gear up capacity to make and deliver parts at Ford's Q1 quality rating within a year of its plant becoming operational and (2) to develop (and review with the Ford supplier quality assurance engineer) a quality operating system within 120 days of the signing of the agreement. The agreement also included a rider that stipulated that the promised volumes were preliminary and would change as Ford acquired more information about the market for its vehicles. The concluding paragraph of the agreement laid out Ford's options to terminate if Peak did not comply with its terms.

Before initiating its current relationship with Alpha, Delta had had two other viable options: Beta Tires and Gamma Tires. Its relationship with the former had soured in 1995, when Beta exploited a shortage in the tire market to increase prices opportunistically in the middle of a contract. At the time, Alpha had tended to ration the limited volume of tires sourced from its European factory, typically wanting and being content to receive only 10% volume share of Delta's tire requirements. Things changed dramatically when Alpha commissioned its U.S. manufacturing capacity in 1996. An Alpha manager explained the following:

> With a tire purchase volume three times that of any other North American customer, Delta was obviously a very important customer for us. We needed to fill our plant capacity. We decided to target a much larger share of their requirements than the approximately 10% we were currently getting. But knowing that our competitors would be thinking the same thing, we sought a long-term relationship. Fortunately, Delta managers were thinking of a long-term relationship as well. We were both on the same page, and after a series of particularly productive meetings between our two management teams, we wrote up this rather informal one-page document. It simply said that Delta would purchase at least 51% share of their earthmoving tires from us, and we assured them that we would give them the lowest prevailing price.

Reconciling with Previous Research

Extant research provides insights into the structure of arrangements and modes of governance. The various theories advanced suggest different approaches to structure. For example, the various bases of power (French and Raven 1968) engender asymmetrical relationship structures whereby the powerful parties dictate to the weaker parties and exact returns in proportion to their influence (McAlister, Bazerman, and Fader 1986, Porter 1980) Because social exchange theory assumes that parties expect that entering into and maintaining relationships is rewarding in the long run, it reaches quite different conclusions about relationship initiation (Blau 1968, Homans 1958) Specifically, social exchange theory implies that relationships begin small, with the parties interested more in gauging each other than in articulating formal expectations about the nature of relationship outcomes (Lambe, Wittmann, and Spekman 2001), but it stops short of inferring formal governance structures

Transaction cost theory predicts that firms that invest in relationship-specific assets are likely to invoke formalized governance structures at the outset to prevent opportunistic exploitation (Heide 1994, Heide and John 1992) Governance modes in such relationships are hypothesized to be unilateral, that is, the powerful partner has the leverage to formulate rules and instructions and to impose decisions, and the weaker firm is concerned primarily with protecting itself from being exploited (Heide 1994) Along the same lines, absence of relationship history leads relationship contract theory to predict that governance at the outset will be by formal, legal agreements (MacNeil 1980) When power asymmetries prevail, the powerful party is likely to seek a safeguard an explicit contract that enables it to coordinate activities, protect its reputation, exact concessions, and insist on formalizing its advantage in a written legal document (Lusch and Brown 1996) In contrast, because there are no well-accepted incomplete contracting frameworks (Maskin and Tirole 1999), the theory of incomplete contracts suggests that firms are content to sign contracts that do not detail contingencies but attempt to maximize contract value (Hart and Moore 1999, Tirole 1999)

Comparisons of the three field sites reveal clear patterns in the structure and governance of relationships from the outset Consistent with theory, the powerful party dictated the terms of each arrangement and exerted influence in defining terms that established its advantage Using French and Raven's (1968) widely adopted bases of power (reward, coercion, expert, information, and legitimacy), we can interpret GE's reward and expert power as deriving from its product range and brand equity However, RCI's access to information through market reach, though untested, did not carry the same leverage as GE's power Using the same framework, we can determine that Ford had the upper hand in its relationship with Peak With respect to the Alpha–Delta relationship, Delta had more alternatives on paper (recall that its relationship with alternate supplier Beta had soured), but this advantage was offset by Alpha's size and technology expertise

However, somewhat at odds with the extant literature, we find that the powerful partner did not always seek a formal agreement to protect its position Research on the use of power indicates that the powerful party protects its interests by securing formal acknowledgment of its valuable assets Yet GE avoided a written contract with RCI, and GE was under no obligation to offer RCI anything except to make its product range available It was also unclear to GE what RCI's founder, Mark Schwartz, would bring to the relationship We suspect that because GE had a strong branded product line and could have withheld supply to RCI at any time, it did not need a formal document to protect itself

Ford's relationship with Peak began along the same lines At the outset, Ford was interested in a handshake agreement that would enable it to hedge, if necessary, its future options in case Peak failed to deliver When Yancy insisted on subsidies and volume commitments, Ford reverted to the prescriptions of extant theory, that is, the use of a formal agreement that addressed issues of technology transfer, quality standards, capacity reservation, and a market contingency to protect Ford's interests That Ford submitted to a more well-specified arrangement than the one GE granted RCI was perhaps due to Yancy's astute exercise of power relative to Ford's minority supplier development program, whereby corporate headquarters directed operating divisions to seek sourcing relationships with and to increase purchases from minority suppliers The corporate group's action can be explained by its desire to preserve a reputation for fair dealing that would enable Ford to continue to exchange transaction-specific investments under conditions of high uncertainty Yancy leveraged Peak's status as a sought-after minority vendor to Ford's corporate purchasing group to negotiate what appeared to him to be a generous written agreement

Although both partners were formidable in terms of size and resources, whereas Delta Mines had two alternatives, Alpha Tires' next best customer was far smaller in scale Because Alpha's U S factory investments necessitated tire sales volumes and Delta needed quality tires at low prices, especially in the wake of its poor experience with Beta Tires, there was little jockeying for advantage in the contract terms Sufficiently broad to align the two sides' goals reasonably well, the agreement was perhaps consistent with the prescriptions of the theory of incomplete contracts, whereby both sides are willing to enter into a contract that specifies neither all the contingencies nor specific performance criteria The partners' intentions were mutually transparent, both sides knew they had to deliver whatever it would take to realize their objectives Their mutual interdependence was sufficient to keep the two parties honest

Is it because it is difficult to write contracts that cover all contingencies that the powerful parties did not seek formal contracts? Analyzing our field findings in the light of the various theoretical perspectives, we believe that this might be a partial explanation In mature and commoditized markets with a wide range of available alternatives, the powerful party prefers an informal agreement that reduces investment to a minimum and accommodates easy exit in the event that things do not work out (in each of the three relationships we studied, the powerful party did not have much at stake at the outset, and the associated risk of relationship failure was minimal) Were a relationship to evolve favorably, it would always be possible for the powerful party to leverage its position and revisit the terms and conditions at a later date An informal agreement might be viewed as an option that a powerful firm can buy at the outset of a relationship and subsequently cash in if the relationship succeeds and if the weaker party delivers added value

A weaker party that has and exercises the power to demand a formal agreement is likely to be countered by a powerful partner that seeks not only to protect its position but also explicitly to write the terms of the agreement in its own favor

Ring and Van de Ven (1994) suggest that long-term cooperative relationships require that individual choices made in the present and realized in the future be congruent Because the development of interfirm relationships is grounded in individuals' motivational and cognitive predispositions, managers need to engage in sense making and bonding processes (Weick 1979) that permit parties with initially different views of the potential purposes and expectations of a relationship to achieve congruency This sensemaking process gives rise to psychological contracts (Argyris 1960, Levinson et al 1962) that, different from most legal contracts, consist of unwritten and largely nonverbalized sets of congruent expectations and assumptions that transacting parties have about each other's prerogatives and obligations The reluctance of the powerful party forces the weaker firm to take the lead in achieving congruence and in developing an informal (psychological) contract in lieu of a formal one The weaker party will need to accept that the other side might be only marginally aware of mutual expectations from the relationship

Our inferences from field research suggest the following propositions

P_1 In mature industrial markets, the more powerful party will prefer an informal agreement at the outset of a buyer–seller relationship

P_2 In such a relationship, the weaker party (which has the power neither to structure a formal agreement nor to set up formal safeguards to protect its investments) will initially attempt to construct a psychological agreement that paves the way for subsequent formalization

Assessing the Partner's Performance in a Relationship

Table 2 describes the actions taken by the two firms in each dyad as the relationship moved beyond the initial stages Moving beyond initiation, absent a formal contract and the onus being entirely on RCI, Mark Schwartz went out of his way to demonstrate his firm's value to GE Danny Schwartz explained the following

> My father was able to bring a lot of value to GE from the start For example, he personally devised and implemented a number of innovations, such as a universal mount option that enabled GE engineers to rationalize dozens of models of potential relays to six that significantly reduced GE's manufacturing costs On the sales front, in addition to significant sales volumes, we realized significant price premiums [and thus margins] for GE on their product sales in the aftermarket This was another unanticipated bonus for GE

General Electric rewarded RCI's efforts by granting it product exclusivity in the aftermarket These terms were not firmed up in the absence of a formal written contract, yet notwithstanding GE's ability to change the nature of the agreement, both parties accepted and honored the conditions In the face of RCI's superb execution and performance, which far exceeded expectations, GE had no reason to be dissatisfied Indeed, it was GE's confidence in RCI that led it to offer its partner exclusivity in the aftermarket Meanwhile RCI continued to add value by breaking bulk and by offering small, appropriately packaged and labeled assortments Moreover, it provided credit to wholesalers that frequently purchased GE products in small quantities

TABLE 2
Promise and Performance

Dyad	Description
GE–RCI	Soon after initiating the relationship with GE, Mark Schwartz worked with its managers to develop new products through a cooperative problem-solving approach GE reciprocated by granting RCI exclusivity for its entire line of contactors, capacitors, and relays In the first ten years of the relationship, sales volume grew to $20 million GE realized significant gains in a market that (at that time) it hardly knew existed, and its products and brand name helped RCI establish itself as a master distributor
Ford–Peak	Exceeding the expectations of the agreement signed with Ford, Yancy achieved Ford's Q1 quality disciplines in his factory in half the required time Ford was unable to deliver the $1 8 million production volume promised in the first year but still made good on its assurance of providing Peak a $2 9 million start-up subsidy However, Peak experienced financial difficulties, which Yancy attributed to Ford's lack of commitment to the promised volumes
Alpha Tires–Delta Mines	Armed with the pledge that it would be granted in excess of 51% of Delta's earthmoving tire purchases, Alpha made significant investments in the relationship Delta responded by increasing Alpha's share of its purchase volume to nearly 75% over an 18-month period and by offering Alpha a significant share of other tire requirements not covered in the agreement Delta not only mitigated the setback with Beta Tires but also gained the cooperation of a leading technological provider of mining tires at attractive prices

Schwartz continued to develop new markets and introduce product innovations that further reduced GE's manufacturing costs, and GE managers responded by making institutional resources available to Schwartz (an action they had previously been reluctant to take) and by consciously eliminating their alternate distribution options Therewith, arrangements ceased to be of the informal handshake variety Volume quotas and targets by part number were discussed and agreed on, and agreements, albeit informal, began to emerge For example, RCI was not to distribute competing products from other suppliers, and GE was to provide RCI exclusivity in the aftermarket distribution of its components Although informal, the rules became etched into both sides' expectations and assumed the force of a written contract

With key parameters set forth in its formal contract with Ford, Peak performed admirably by achieving the required quality rating before the projected 12 months Yancy pointed out the following

> I think we impressed the Ford operating managers with the quality discipline we were able to quickly institute in our factory We ensured that we did better than expected on all the points that Ford had specified in the contract

Things began to change when, in the face of an unexpected downturn in car sales, Ford ordered only $700,000 instead of the promised $1 8 million worth of parts for the first six months This deviation caused considerable operating difficulty for Peak, which was soon short of working capital Ford corporate managers (not the electronics division operating managers) compensated Peak by advancing in the first year the entire $2 9 million in subsidy payments Despite a solid beginning, Peak experienced financial difficulties during its first year of operations, incurring operating expenses that were twice what Yancy had anticipated Ford perceived Peak's subsequent working-capital shortfalls as due to accounting errors Ford further discovered that Peak's expenses were understated Although Ford's operating managers believed that they had gone beyond their contractual obligations to shore up their partner, Yancy continued to perceive the origin of Peak's problems as Ford's failure to deliver the promised volumes Moreover, Peak was unable to sell its spare capacity to other buyers, despite Ford managers' assertions that they had introduced the company to several potential buyers Yancy's view was clear

> All our problems were due to Ford's failure to deliver the promised volumes Quality is related to having a steady flow of orders Without scale it is impossible to maintain quality The entire operation suffered when the volumes did not come We were back to square one with no apparent recognition of this fundamental operating principle at Ford

Good intentions combined with performance achievement fostered a more durable relationship between Alpha Tires and Delta Mines The account manager Steve Tyrone explained Alpha's approach after signing the initial agreement

> Having received Delta's commitment to purchase 51% of its earthmoving tires from us, we began to make serious investments in the relationship First, we made sure that our tires were delivered on time and in the right quantities A mine can come to a standstill if the trucks are not operational to move the ore We also developed a comprehensive tire management system designed to increase tire life and reduce Delta's overall tire costs, and [we] established at our own expense, at each of the mines, local warehouses to speed tire replacement and repair and thereby significantly reduce Delta's operating costs as well We also began to develop a new, low profile, low-pressure tire tailored specifically to Delta's operating conditions and worked with Delta's equipment vendor to design new hardware that would enable Delta to use the new tires without overhauling its equipment at considerable cost These are just a few of the many actions we took that were not even discussed when we got into the new relationship with Delta

A Delta manager explained his firm's response as follows

> Impressed with their performance, we offered Alpha a share of tires on our mine maintenance equipment as well [the original agreement was for earthmoving tires only] Moreover, when the mining service contract at one of the mine sites came up for renewal, Alpha's initial bid was uncompetitive Under normal circumstances, we would have rejected Alpha's bid and awarded the contract to [the] lowest-cost vendor Instead, at the behest of several managers from the mines, we offered Alpha a chance to revise its original bid Such an approach was virtually unheard of in our firm Kudos to Alpha that they not only came back with very attractive pricing but [also] followed up with the highest service levels

By 1998, Alpha's share of Delta's earthmoving tire requirements had reached 75% In addition, it had a share of tires for mine maintenance equipment and an after-service contract for one mine

Reconciling with Previous Research

As both sides moved beyond the initiation stage, their performance relative to expectations influenced the strength of the relationships The research stream pursued by the IMP group conceptualizes an exchange relationship as a series of discrete episodes or interactions that yield economic and social outcomes (Håkansson 1982, Håkansson and Wootz 1979) It has been determined that evaluations of such interactions that provide opportunities for firms to interpret each other's actions (Anderson and Narus 1990, Doney and Cannon 1997, Morgan and Hunt 1994) are a factor in firms' decisions to continue or terminate a relationship (Friedman 1991) and to influence the nature of dispute settlement (Pruitt and Rubin 1986) Consistent with the aforementioned research, several conceptual process models of relationship development in marketing (e g , Anderson 1995, Ford 1990, Håkansson 1982, Håkansson and Wootz 1979, Nevin 1995, Wilson 1995) have implied that firms evaluate each other's performance episodically (or periodically) and have posited that parties remain in a relationship as long as its rewards are satisfactory relative to its costs

Research in relationship management has tended to focus on events that occur within the frame of the contract (formal or informal) As we discuss next, our findings suggest that two sets of actions determine performance in a relationship One is the set of activities that is mutually agreed on formally or informally by the parties, the second involves activities that are outside of the "letter" of the agreement For example, in the absence of a formal contractual arrangement, the GE–RCI relationship was driven almost entirely by the latter's unilateral efforts to perform beyond the informally agreed-on terms RCI's extracontractual performance, on which RCI delivered superbly in terms of sales volumes and premium prices, soon became an informal expectation on GE's part This "above-and-beyond" performance led to more structured expectations, and the virtuous cycle kicked in GE formally awarded RCI exclusive aftermarket distribution rights for a variety of its products

In contrast, despite heavy investments on both sides, the Ford–Peak relationship never got going either within or outside of the parameters of the agreement Neither party met the other's expectations within the contractual terms, Peak believed that Ford reneged on its order volume commitments, and Ford believed that Peak was unable to achieve production viability despite having been compensated for its sales deficits

The Alpha–Delta relationship illustrates complementary performance both within and outside of a contract When Alpha provided a range of extracontractual technical assistance, Delta Mines responded by granting its partner greater-than-promised market share and additional business in unexpected areas These extracontractual actions were mutually beneficial, and their immediate and direct impact on order quantities and service levels was a healthy shot in the arm for the relationship

Our findings are consistent with research in services marketing that suggests that firms do not necessarily restrict their evaluations of each other to performance per agreement terms but often include actions outside of the agreed-on frame (Bitner 1995, Gronroos 1994) For example, from a customer's perspective, relationships are built not only on encounters that test a seller's ability to keep its promises but also on encounters that exceed expectations It is during such encounters that customers glimpse sellers' efforts, each encounter has the potential to contribute to the customers' overall satisfaction and willingness to continue to do business with the seller (Bitner 1995, Bitner, Booms, and Tetreault 1990, Woodside, Frey, and Daly 1989)

A parallel can be found in the sales management literature Traditionally, research on performance of sales representatives has focused on in-role aspects such as sales volume, evaluation of sales effectiveness, and so forth (Brown and Peterson 1993) More recently, the definition of performance has been broadened to include such extrarole aspects of performance as organizational citizenship behaviors, which Organ (1988) defines as discretionary behaviors on the part of a salesperson that directly promote an organization's effective functioning

In the context of our field research, extracontractual actions such as the ones performed by RCI for GE and by Alpha Tires for Delta Mines significantly fortified a developing relationship Such behaviors enhanced the perception of a partner firm's performance and thereby the focal firm's long-term orientation to the relationship When firms perceive each other as having failed to deliver on their promises, such as in the Ford–Peak dyad, nothing can resurrect the faltering relationship However, when extracontractual behaviors reinforce those within the agreement, as with the other two dyads, the relationship is advanced

In summary, consistent with social exchange theory, we find that firms are more interested in gauging each other in the initial stages than in articulating formal expectations about the nature of relationship outcomes (Lambe, Wittmann, and Spekman 2001) It is in this context that the two sides evaluate each other's actions in the early stages Consistent with previous research, we also find that at any time that partners fail to perform to agreed-on terms, the relationship is in jeopardy Finally, our field investigations suggest that to be able to move a relationship to the next level, firms need to go beyond the terms of the contract It is favorable performance in the extracontractual venue that influences and redefines the other party's expectations over time

The following proposition on the role of actions outside of the agreement terms extends the prescriptions of extant research

> P_3 Because the two parties' expectations about the nature of relationship outcomes are only loosely formed in the initial stages of a buyer–seller relationship, it is actions that go beyond the initial terms that help the two sides formalize and broaden their relationship over time

This does not preclude actions outside of the terms of a contract that have unfavorable outcomes Although our field investigations found no such cases, extracontractual behavior can have a destabilizing effect in such situations and can even lead to relationship dissolution

Relationship Development and Maintenance

Table 3 describes how the three dyadic relationships evolved over time Continuing growth in trust and commitment was interrupted for the first time when Mark Schwartz transferred control of RCI to his son, Danny Schwartz This phase was characterized by reduced commitment on GE's part and the younger Schwartz's subsequent attempts to establish parity Danny Schwartz explained this

> It was not long after I took over from my father that GE began to withdraw the exclusivity arrangement with RCI for one product after another Being young and hotheaded, at first I threatened to terminate the relationship, but this had zero impact on GE It took me a while to accept the new economic reality that the aftermarket had become sufficiently large and important for GE to serve through alternate distributors It didn't matter that we had actually made that reality happen It is only then that I started to reduce the disparity in our relationship For example, I successfully established an alternate source of supply of "contactors" by helping Component Manufacturing, a small supplier, to tool up and manufacture devices at a cost lower than GE's The entrepreneur who set up this operation was a GE engineer who was well known to my father I also negotiated with GE's competitor, A O Smith, to develop a line of private label motors to be sold under the RCI brand It did not take GE too long to realize our value and importance to them, but by then our relationship had entered a new phase

Faced with Schwartz's success and with RCI as its de facto exclusive distributor, GE was forced to initiate a new phase in the relationship that was characterized by pragmatic acknowledgment that RCI possessed strengths and alternatives as well The GE senior sales manager John Elliot was assigned to work with RCI to bridge the "misunderstanding" Elliot explained

> I meet everyone in the market, including those who request direct sales I have informed Danny Schwartz of every such meeting in advance so that there is no suspicion of going behind his back In every case, it has so worked that we have ended up convincing the party that going through RCI is the most efficient and effective way for us to service that customer Our understanding goes beyond that Every so often we will have excess in production that comes our way, and with only a phone call

TABLE 3
Trust and Commitment

Dyad	Description
GE–RCI	Mark Schwartz and GE managers developed a high level of trust in one another GE granted RCI exclusivity and a private label option for a few selected product lines When Danny Schwartz succeeded his father, GE began to withdraw RCI's product exclusivity The younger Schwartz responded by developing alternative suppliers GE subsequently appointed a new account manager, John Elliot, who brought a sense of pragmatism to the relationship and steadily built bonds of trust with Danny Schwartz
Ford–Peak	Peak's cost overruns and Ford's reduced purchase volumes soon steered the relationship off course The electronics division managers resented that Yancy had bypassed them to seek assistance directly from Ford's corporate managers Accounting irregularities further clouded their attitude toward Yancy For his part, when promised volumes did not materialize, Yancy believed that he was justified in seeking what he considered a reasonable level of compensation directly from Ford's corporate managers With such divergent views of the same set of events, it was not long before the two sides lost trust in each other Ford managers subsequently terminated the relationship
Alpha Tires–Delta Mines	Delta's one-page agreement to deliver Alpha more than 51% share of its tire volume was broadened beyond Tyrone and Copper, the respective architects of the relationship Alpha continued to expand its service and support, and Delta signaled its satisfaction by increasing Alpha's share of its purchases of earthmoving tires and by granting Alpha a larger share of its purchases in other tire categories With a change in key personnel on both sides, Delta managers revised their perception of Alpha's service and its share of tire purchases accordingly Under the guidance of new managers on both sides of the dyad, the relationship slipped somewhat, though Alpha continued to receive a greater-than-51% share of Delta's earthmoving tire purchases

> we will ship products to RCI's warehouse Usually we have been able to work out a pricing that is profitable for both

Reflecting on the changed mode at GE, Schwartz offered this complementary view

> John [Elliot] is part of all our planning meetings We do not hide anything from him He knows our customers, what they buy, our profits, everything He knows the value we bring to the relationship John has responded by becoming RCI's spokesperson in GE He is always making sure that RCI is not treated unfairly GE is a large firm and, sometimes, corporate directives can hurt individual relationships John knows the market reality and his local presence and our mutual trust have helped educate GE Our rapport with him has put the relationship back on an even keel

Whereas cooperative behavior prevailed eventually in the evolution of the GE–RCI relationship, excessive distrust impaired and ultimately brought about the demise of the Peak–Ford relationship At a time when neither side had any reason to trust the other, Peak's early demand for increased financial assistance was a clear effort to increase Ford's commitment Yancy's subsequent achievement of quality, productivity, and other targets specified in the contract built his credibility with the electronics division managers and enhanced Peak's commitment level When reasonable commitment levels had been established on both sides, the relationship appeared set to make gains, but a downturn in its markets prevented Ford from ordering the promised volume from Peak Yancy explained his actions in response to this turn of events

> When Ford's operating managers were unrelenting of our request for additional subsidies generated by their shortfall in orders, we took up the matter with corporate purchasing[, which has] known me as a reliable supplier of coal for a long time

Disinclined to view the volume shortfall as a failure on their part and resenting Peak's dependence balancing efforts, the operating managers developed distrust for Yancy Trust was further eroded and Yancy's capability and credibility questioned when Ford discovered several accounting and forecasting errors by Peak The trust pendulum had swung dangerously to the other side Lack of trust between parties began to affect the firms' commitment Ford management had decided that unless Peak was able to demonstrate its long-term viability on its own, the relationship would be terminated Ford's willingness to consider Peak a PCB supplier had been a function of the trust that had developed between Yancy and Ford's corporate managers in the coal contract relationship However, this trust had not transferred automatically to Yancy's relationship with the operation managers who were responsible for the Peak relationship The fledgling trust that was built through Yancy's performance within the contract was insufficient to weather an economic downturn and dissolved altogether when both sides failed to live up to the terms of the agreement More fundamentally, it was lack of trust that impeded the building of commitment

Despite historically high levels of potential interdependence, the Alpha Tires–Delta Mines dyad was initially a marriage of convenience The starting point for a renewed relationship between the two firms was the personal and professional relationship between Mike Copper, the head of corporate purchasing for Delta, and Steve Tyrone, account manager for Alpha Copper recalled the following

> Having done an "ABC" analysis, it became apparent that there were about half a dozen items at the mine that accounted for 80% of our purchase dollars It made sense to develop a relationship with a few selected vendors for each of these items We had transitioned the top two items

> to that mode with impressive results in the last year, and I found in Steve [Tyrone] a willing ally in working with us on the No 3 item earthmoving tires

Tyrone corroborated Copper's view

> Copper was interested in building strategic alliances with Delta's key suppliers With our North American plant commissioned, we were wedded to the idea of moving from competitive transactional exchanges to more collaborative long-term relationships It was central to our strategy of gaining production economies at the new plant Our increased dependence on Delta's purchase volumes to support the new U S manufacturing facilities and Delta's disappointing relationship with Beta Tires had provided the necessary impetus for Copper and [me] to work together

The development of the relationship between Tyrone and Copper brings to mind observations by Ring and Rands (1989) of situations in which transacting parties reached informal understandings before their organizations negotiated and committed to legal contracts The two men engaged in intense sense-making activities over an extended period that yielded a strong psychological contract regarding the need for cooperation between their respective organizations They trusted each other's ability to commit their respective principals to the venture and had long-range plans that anticipated the success of the initial cooperative effort As the two men experienced each other's ability to deliver the terms of their psychological contract, their reliance on trust deepened Consequently, the men increasingly worked outside of the terms of the formal agreements between their organizations In summary, although specific actions to be taken with respect to certain provisions of legal contracts were not yet spelled out, informal norms and understandings of acceptable behavior that stemmed from trust enabled the parties to proceed to executing the informal commitments implicit in their psychological contract, which then set the stage for the establishment of formal commitments

In contrast to Mark Schwartz's initial emphasis on building personal trust with the GE managers, Alpha's approach involved not just personal trust but also extensive commitment by investing people, processes, and the organization in the relationship Copper explained this as follows

> As the mine personnel [came] to see what Alpha was willing to do, they responded by both increasing the percentage of earthmoving tires purchased from Alpha and expanding the scope of the relationship to other tire categories as well The key to the two sides growing closer to [each other] were all the actions that the Alpha executives and tire service personnel took on their own initiative I think if these individuals on Alpha's account and service teams had attempted only to execute the letter of the contract, it would have been unlikely that our people would have raised our firm's commitment

Even as the relationship developed, personnel changes occurred on both sides When Tyrone was promoted within Alpha and moved to Asia, a veteran Alpha salesperson assumed management of the Delta account At about the same time, the relationship having passed several designated milestones, Copper handed off management responsibility to another Delta materials manager The transitions affected the trust levels in the relationship As we observed in the other relationships, trust did not transfer seamlessly, and the chemistry between Tyrone's and Copper's successors was not the same Copper explained, "Although the two managers were working constructively, they had not gone through what Tyrone and I had The relationship between the two was not as intense as my relationship with Tyrone"

Reconciling with Previous Research

Our findings from the three field sites reveal a process whereby trust and commitment are formed (or not) and contribute to the development (or destruction) of a relationship Our research indicates that trust invariably forms between individual people in an organization, whereas commitment is an interorganizational phenomenon Thus, we infer that trust and commitment operate at different levels in a relationship Trust is an interpersonal construct, and commitment is an interorganizational one We believe that this distinction is a nuanced departure from extant wisdom Much of the literature on relationship marketing fails to distinguish interpersonal from interorganizational effects Some scholars have assumed that both trust and commitment operate at individual levels (e g , Ganesan 1994, Morgan and Hunt 1994), others have assumed that the trust and commitment variables operate across individual and organizational levels (e g , Doney and Cannon 1997) Focusing on the constructs themselves, most scholars are indifferent to the levels at which they operate To some extent, our conclusions illuminate previous findings of the IMP group, which has advocated the use of interpersonal and interorganizational variables to study buyer–seller relationships In addition, Wilson's (1995) conceptualization of structural bonds that arise from investments made by firms and social bonds that grow out of mutual personal relationships perhaps gains new meaning in light of our inference

We believe that our finding that trust forms between individuals and not organizations is a consequence of the context of our study, that is, relationships in commoditized industrial markets Such markets are characterized by equivalent products and technologies across vendors, and absent any significant uncertainty, customers expect vendors to deliver automatically on product quality and performance Trust in a firm is consequently a given, that is, a hygiene factor Relationship management, service, and support become the main differentiators and the basis for judging vendor performance Promises made and kept by account executives become the cornerstones of such relationships, and trust between individual people in the firm gains prominence (and possibly dominates other forms of trust) Expressed as investments made by firms, commitment begins to emerge at the organizational level In summary, our research provides a fine-grained interpretation of the trust and commitment constructs and the levels at which they operate

> P_4 In buyer–seller relationships in mature industrial markets, trust is mainly built between individuals across the dyad, and commitment is formed and formalized at the firm level

Another conclusion that emerges from our observations is the relationship between trust and commitment Whereas trust between Mark Schwartz and GE managers engendered a higher level of commitment between the respective firms, distrust between Yancy and Ford managers was responsible for weakening Ford's commitment to Peak That trust drives commitment is consistent with the work of Morgan and Hunt (1994) However, when we pin the development of trust at the individual level, our causal flow also has hitherto unexplained implications for how organizations build commitment based on their managers' perceptions and actions

It is possible that the causality goes both ways (Morgan and Hunt 1994) For example, in the face of Alpha Tires' decision to site a North American factory and Delta Mines' promise to grant Alpha at least a 51% share of its tire purchases, it might be argued that an organizational commitment preceded the trust bonds that Tyrone and Copper developed If this were true (i e , if commitment causes trust), the Ford–Peak partnership should have prospered as well, because both parties entered the relationship with strong commitments That Ford's commitment deteriorated consequent to poor performance by Peak leads us to believe that the directionality is from trust to commitment rather than the other way around However, many times a commitment platform is prerequisite to individuals' engagement in trust-inducing interactions There is no doubt that such a platform preceded individual interactions in the Ford–Peak and Alpha–Delta dyads However, whether that platform is strengthened or weakened depends on how people on the two sides of a dyad engage one another Tyrone and his colleagues at Alpha and Copper and his colleagues at Delta reinforced their firms' commitment platform by engaging in mutually trustworthy actions

In conclusion, our findings build on research that has established a causal link between trust and commitment They suggest that interpersonal dynamics affect interorganizational orientations, whereas the opposite is not true Our results also have implications for how firms in mature industrial markets manage interfirm relationships when trust between individual employees breaks down as a result of personnel turnover The following propositions summarize our findings

P_5 The presence (or absence) of interpersonal trust in buyer–seller relationships in mature industrial markets facilitates the development (or destruction) of interorganizational commitment

P_6 The existence of interorganizational commitment facilitates only the formation of new interpersonal relationships, not the subsequent development of trust

Processes That Explain Relationship Initiation and Maintenance in Industrial Markets

The fresh insights teased out of the four propositions developed herein have informed the identification of five processes that explain the evolution of buyer–seller relationships in mature industrial markets

Leveraging Relative Position and Power to Define Initial Agreement Terms

Asymmetry in the resources that each party controls typically results in the two sides of a dyad not being equally dependent on each other Thus, power dependence is usually skewed in favor of a firm at the outset Given this condition, theory suggests that the powerful party will attempt to extract concessions We suggest that the powerful party will not formalize its position because it has other levers to protect itself The two sides will arrive at an agreement that guides the exchange of products or services, defines the broader infrastructure that supports the relationship, and provides both sides with a clear understanding of what to expect from each other The weaker party, which usually lacks the leverage to force a protective written agreement, needs to recognize and accept that a powerful firm will control a disproportionate amount of the initial available surplus

Evaluating Performance and Converting It to Interpersonal Trust and Interorganizational Commitment

As a relationship moves into the execution phase, the parties will attempt to implement the letter and spirit of the agreement At this stage, each side's performance is noted and monitored by the other side and measured against a benchmark, which typically is expectations Conceptually, we distinguish between performance within and outside of the terms of an agreement It is often the case that the two sides agree to specified performance levels and construe anything less to be a shortfall To understand the impact of performance outside of the contract terms, it is helpful to examine unanticipated deviations from conditions outlined in a contract Contract execution occasionally encounters difficulties For example, a buyer might request an immediate shipment or midstream enhancement in quality standards, or a seller might develop a pressing need for cash flow and thus advance payments Accommodation of such requests entails adjustments that significantly increase the immediate cost of executing the extracontractual request The cost increases will far outweigh any short-term benefits to the firm that accommodates the requests Although refusal to take action in response to such requests would, in theory, not violate the agreement, dyad members view fulfillment of such requests in a highly favorable light

The development of trust and commitment is built one interaction (or episode) at a time We suggest that trust is built and maintained at the individual level and that commitment is a broader organizational phenomenon Actions within and outside of the terms of an agreement have a differential impact on trust and commitment Performance within the contract terms engenders mutual respect for a cross-section of two organizations and is extremely important for building both trust between individual members of the firm and commitment between firms Performance outside of the terms of a contract is more important for jumpstarting the trust-building process between individuals

Transferring Interpersonal Trust to Interorganizational Commitment

Trust between individuals spurs the development of commitment between firms Individuals who build trust in each other will transfer this bond to the firm level The cumulative effect of several such transfers is an increase in interfirm commitment Our formulation further suggests that the core of relationship development is the personnel who manage the dyad When trust levels increase sufficiently, the managers will encourage their firms to invest in and thereby increase commitment to the relationship We do not expect the reverse effect Our conclusion that interorganizational commitment does not foster interpersonal trust has implications for relationship management Managers will not gain from their firms' commitment if they do not create an environment that fosters trust building between contact personnel on both sides of the dyad

Increasing Interpersonal Trust to Balance Initial Contract Terms

Interpersonal trust affects not only interorganizational commitment but also performance Individuals who begin to trust each other become motivated not only to meet their partner's expectations within the agreement terms but also to step outside of the terms to help the other side in times of need Such actions elevate a partner's evaluation of both performance and trust The flip side of this process is that individuals who have reason to mistrust a partner's contact personnel are less motivated to uphold their end of the bargain and are unwilling to take any actions outside of the contract terms This reinforces the reasons for mistrust and precipitates a rapid breakdown of trust and, in turn, commitment in the relationship

Increasing Interorganizational Commitment to Balance Initial Power Asymmetries

A powerful party that has previously extracted a disproportionate share of the surplus will relent somewhat In economic terms, this is an "adjustment" for the lower risk that the powerful party now perceives in the relationship The contract, though still not fully equitable, will likely be more so than previously These exchanges and subsequent negotiations will continue in a virtuous cycle In a vicious cycle, the opposite is the case With reduced commitment, the two firms will exploit their positions and leverage any asymmetries to their respective advantage Negotiations will become increasingly difficult because the firms will perceive each other's demands as unreasonable The relationship will become competitive, turn sour, and eventually collapse

Summary

We have demonstrated that through these five processes, healthy relationships can be built and sustained regardless of initial power asymmetries By the same token, a balanced power situation at the beginning of a relationship does not guarantee that a virtuous cycle of commitment and trust will prevail

Conclusions

Drawing on our field research findings as well as theories of power, dependence, contracts, performance, commitment, and trust, we developed six propositions that capture the process of relationship development and identified five processes that illustrate how the propositions play out in the evolution of a relationship Our findings suggest that relationships are built on the intentions and interactions of firms and individuals More specifically, they emphasize the role of initial power-dependence asymmetries in the development of contracts and their subsequent reduced impact in relationships that are characterized by high degrees of commitment and trust We hypothesize that interpersonal trust enhances interorganizational commitment over time and that high levels of trust and commitment can, in turn, neutralize the impact of initial power-dependence asymmetries We do not preclude the simultaneous existence of these various mechanisms, rather, we believe that their relative effects on relationship development change over time, thus enabling weaker firms to thrive in equitable relationships with powerful partners Our field findings also lead us to speculate that initial symmetries in power and dependence at the beginning of a relationship do not guarantee its long-term viability and success Even in this situation, we believe that satisfactory performance and the subsequent development of trust and commitment are critical to successful relationship management

The five processes offer practitioners and academics alike several guidelines for managing industrial buyer–seller relationships Management of relationships in commodity markets is much more than trying to "tie" the other side to a long-term contract Customers are seldom interested in writing well-specified contracts at the outset in such situations A weaker party might benefit from working to develop an informal contract rather than demanding a formal written one As the relationship moves to the execution stage, it is important that a firm keep its promises This not only creates a favorable perception of performance but also crystallizes and shapes the other side's expectations over time Having performed satisfactorily within the agreement terms, a firm's willingness to step outside of the agreement and take positive actions that benefit the other party will dispose the other side to reciprocate in kind and, more important, influence how the relationship evolves over time

We also find that relationship development is not smooth and monotonic through the various stages Internal and external changes can derail even a well-set relationship The five processes we have described offer account managers guidance in weathering rough seas in a relationship For example, firms that are interested in pursuing long-term relationships should appoint boundary-role individuals who are capable of engendering trust in the relationship Because our research indicates that interpersonal trust can build interorganizational commitment, it is just as important to pick and empower the right people at the interface as it is to support a relationship with appropriate institutional commitment Moreover, at times of organizational change, firms should convert trust into institutional commitment before effecting sensitive personnel changes

Limitations and Future Directions

Our contributions are directed at building a theory of relationship management in mature, industrial markets As prescribed by grounded theory development, our data are based on field investigations that combine multiple participant interviews, observation, and documents related to three buyer–seller dyads As is typical in such studies, the limited number of firms included in our study constrains the generalizability of our interpretations Nevertheless, we believe that our careful selection of the three dyads mitigates this circumstance and that our study has implications for the relationship management literature and for further research

Buyer–seller relationships in industrial markets are complex It is clear that the field is neither neatly bifurcated into "relationship" and "transactional" dyads nor elegantly explained by any unifying theory of managing relationships Our study contributes to a growing body of process models of relationship evolution in industrial markets However, the proof must come from an empirical verification of the processes we have described Such empirical work will require longitudinal studies of larger samples In all three relationships, we found that firms evaluated partner firms' performance on the basis of the outcome of an action taken, not the action itself A worthwhile area for further research is to identify whether and when performance evaluation based on outcomes or actions is more critical to the development of a relationship [1]

Our objective for this research has been to develop a deeper understanding of the processes that affect relationship dynamics We believe that this is crucial to improving the state of the art of relationship management strategies in industrial markets, and we encourage research in this area that expands on the IMP group's pioneering work This study is an early step in that direction

Appendix
Relationship Descriptions

GE–RCI

RCI was founded in 1946 as a GE motor-repair franchise In its subsequent role of master distributor, which it assumed in 1962, RCI sold GE parts to wholesalers, which in turn sold them to thousands of electrical contractors that installed and repaired commercial air-conditioning and refrigeration equipment Because RCI's founder, Mark Schwartz, had initiated aftermarket distribution, RCI was able to secure "exclusive" distribution rights, that is, GE would not appoint any other master distributor or wholesaler to supply parts to the aftermarket Previously, GE had sold parts only to OEMs that assembled air-conditioning and refrigeration systems and maintained them through equipment distributors In 1975, RCI obtained (nonexclusive) distribution rights for GE's fractional horsepower motor, thereby becoming a distributor for a wide variety of GE electrical components and parts

Family circumstances forced an unwilling Danny Schwartz, the 23-year-old son of the founder, to begin to assume ownership responsibilities in 1974 Beginning in the mid-1970s, GE began to strip away RCI's exclusive rights to distribute various GE products With the demise of Mark Schwartz in 1986, RCI's ownership transition was complete, the younger Schwartz was in charge of all business matters By then, with annual sales of approximately $60 million, RCI was among the largest electrical master distributors With approximately 30% of RCI's share, GE was the dominant supplier

From the mid-1970s to the 1990s, against the backdrop of GE's efforts to bypass RCI and restrict its role, RCI had continued to be a valuable distribution partner for GE What had been a strong relationship during the 1960s and early 1970s suffered during the 1980s, seemed to steady in the 1990s, and then stabilized

Ford–Peak

Earl Yancy founded Peak Electronics in 1989 to supply PCBs to the $80 billion Ford Motor Company under the automobile giant's minority supplier vendor program Peak's PCB products formed the interconnection in electronic circuits in the antilock brakes on rear wheels of selected Ford cars Peak's appointment came in the wake of Ford's initiative to broaden its engagement with minority-owned suppliers of component parts

The idea was to build Peak into a $20 million-a-year PCB supplier The relationship, carefully structured and negotiated over 18 months, came to fruition in January 1990, when Peak began initial operations By November 1990, Peak had made major strides in achieving business plan objectives that included quality targets set by Ford and the institution of manufacturing discipline Sales volume increased slowly but steadily in the first few months of 1991 Soon thereafter, the relationship began to founder Peak, unable to achieve a state of financial viability without extracontractual assistance from Ford, attributed the problem to Ford's inability to provide the agreed-on steady stream of orders Both Peak and Ford tried to resolve matters, and for a brief period, it appeared that their differences might be patched up The relationship began to encounter frequent difficulties again, though, and in 1994, Ford attempted to dissolve the relationship Not unexpectedly, Yancy fought vigorously to maintain the relationship and continued to assert that Ford was primarily responsible for its deterioration In the end, the misunderstanding and distrust were far too gaping to bridge, and the relationship collapsed

Alpha Tires–Delta Mines

Alpha Tires, a leading tire manufacturer, had 1996 sales in excess of $10 billion Earthmoving tires accounted for roughly $1 billion, which made Alpha the No 2 player (behind Beta Tires) in earthmoving tires Earthmoving tires were typically sold to mining operations that fitted them to earthmoving equipment, such as haulage trucks Because of the demanding conditions and around-the-clock equipment operation, earthmoving tires were a top-four supply item purchased by mines

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[1] We thank a reviewer for bringing this to our attention

Delta Mines, a $2 billion conglomerate that operated several mines in North and South America, was the largest buyer of earthmoving tires in the United States Until 1996, the relationship between Alpha Tires and Delta Mines was lukewarm, and Alpha maintained a No 2 or No 3 supplier position Delta managers viewed Alpha as a good-quality, though high-priced, tire supplier and as not particularly customer responsive

Alpha's worldwide market share of 20%–25% compares with Beta Tires' 70%–75% and Gamma Tires' 5%–10% In 1996, Alpha, which had previously produced all its earthmoving tire requirements at its factory abroad, made a strong strategic statement by building a state-of-the-art tire facility in the United States Over the next four years, Alpha's market share at Delta Mines increased steadily from 10% to nearly 75%, at the expense of Beta Tires, before adjusting to approximately 55% by the end of 2000

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Stephanie Dellande, Mary C. Gilly, & John L. Graham

Gaining Compliance and Losing Weight: The Role of the Service Provider in Health Care Services

This research provides and empirically tests a conceptualization of health care services in which customer compliance outside of the service organization is necessary for successful health outcomes. Using data from service providers and customers in a weight-loss clinic, the authors examine the provider's role in gaining customer compliance. They find that provider expertise and attitudinal homophily play a role in bringing about customer role clarity, ability, and motivation. This study demonstrates that compliance leads to goal attainment, which results in satisfaction. More important, compliance also leads to satisfaction directly; consumers who comply with program requirements have greater satisfaction with the program.

The examination of compliance in health care services is important because many of today's major societal problems (e.g., high-fat diets, poor physical fitness, smoking) exist because of the poor health care choices that people make. Petty and Cacioppo (1996) indicate that most of the leading causes of death in the United States could be reduced substantially if people at risk would change just five behaviors: noncompliance with healthful behaviors, poor diet, lack of exercise, smoking, and alcohol and drug abuse. The many societal ills associated with noncompliance and the dearth of knowledge on customer compliance warrant this investigation.

It is important to understand the magnitude of the issue of health care compliance, particularly the social consequences of obesity and overweight. In 2002, people in the United States spent $1.3 trillion (i.e., 12.7% of gross domestic product, or $4,765 per capita) on health care–related products and services (Euromonitor International 2003). Obesity is among the most costly medical conditions. According to the National Institutes of Health, 60% of U.S. adults are overweight or obese. The relationship of obesity to other illnesses such as type 2 diabetes, hypertension, heart disease, stroke, and arthritis is significant; obesity now is the cause of more health problems than smoking, heavy drinking, or poverty (American Obesity Association 2002).

As a result of the problem of overweight and obesity, consumers are spending ever-increasing amounts on weight-loss efforts. In the United States, 40% of women and 25% of men are trying to lose weight at any given time, and approximately 45 million people begin a diet each year. Consumers spend approximately $30 billion per year trying either to lose weight or to prevent weight gain, approximately $1 billion to $2 billion of which is spent on medically supervised and commercial weight-loss programs (American Obesity Association 2002).

The solution to the problem of maladaptive consumer behavior does not lie in scientific breakthroughs in medicine, but in finding how to gain consumer compliance with directives of health care providers. As Jayanti and Burns (1998, p. 6) state, "The marketing challenge is considerable in that unhealthy habits and routines are firmly entrenched in consumers." Our purpose is to provide a conceptualization and empirical investigation of the service delivery process for health care services in which customer/patient compliance outside of the service organization is a necessary condition for a successful health outcome. Given that in many health care situations it is expected that patients continue to engage in certain behaviors for their long-term health after they leave the service organization (Bowen 1986; Bowman, Heilman, and Seetharaman 2002), it is crucial that health care providers understand the factors that influence patients' continuing to perform the prescribed behaviors.

Among social influences on health behavior, the health care provider is important (Jayanti and Burns 1998) and is more easily controlled by the health care organization. Bowman, Heilman, and Seetharaman (2002, p. 8) state that "the most powerful cue for compliance is the instruction" from the health care provider. In the weight-control context, behavioral counselors must provide their patients with support for their efforts as well as skills in lifestyle modification (Foreyt and Poston 1998). Given the importance of health care providers, our focus is on the provider's role in gaining compliance. When a service is complex, customized, and delivered over a series of transactions (e.g.,

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health care services), the relationship between the service provider and consumer is key (Crosby, Evans, and Cowles 1990) We seek to identify and relate providers' characteristics and consumers' attributes to both compliance and its outcomes

Literature Review and Research Model

The success of most health care services depends on the consumer's compliance with instructions received from providers Mills, Chase, and Margulies (1983) posit that the service production process entails a transaction that requires direct involvement of the customer, this involvement can affect a firm's productivity, its positioning relative to that of competitors, its service quality, and its customers' satisfaction (Bowen 1986) In health services, the patient provides the vital information about prior health behavior and the raw material input, such as knowledge and motivation, that is necessary for the transformation This input is typically received through direct interface with the health care employee Thus, productivity of health care services entails more than the performance of the service employee, patient performance must be assessed

A Model of Compliance Antecedents and Outcomes

This research focuses on gaining compliance and particularly on the role of the health care professional in helping the customer attain the necessary attributes to comply The model of customer compliance in Figure 1 highlights the ways provider characteristics are expected to affect customer attributes that are necessary for customer cooperation in the process of health care services

Moorman and Matulich (1993) provide an excellent review of health models, drawing on literature from various behavioral fields The overarching theory for our model is what they classify as a behavioral model social cognitive theory (SCT) The SCT perspective perceives human behavior as a dynamic interaction between personal factors, behavior, and the environment (Bandura 1977) A person's thoughts, emotions, and so on are developed and modified by social influences in the environment, and these personal factors influence behavior Thus, our model recognizes the potential of the health service provider to affect consumer attributes that provide direction for behavior (i e , compliance)

Although several characteristics have been advanced as contributing to interpersonal influence, two that have received a great deal of attention are expertise and homophily (Crosby, Evans, and Cowles 1990, Gilly et al 1998) Expertise is the mastery of a particular subject (in this case, weight loss), and homophily is the similarity between individual parties Homophily is a provider characteristic in that it represents the extent to which the provider is similar to the customer, customers will respond to providers as homophilous only if they perceive providers as such (Parrott et al 1998)

For the customer to take part in the delivery of health services, certain customer attributes are necessary To the extent that the health care provider possesses expertise and homophily with the customer, the provider will influence the customers' acquisition of the role clarity, ability, and motivation that are necessary for the customer to perform as expected Role clarity involves understanding the role that must be performed, ability involves the skills needed to perform that role, and motivation is customers' incentive to carry out their role

On leaving the supervision of the health care provider, customers' compliance with instructions is vital The model posits key causal paths (1) Compliance leads to goal attainment (i e , realization of the targeted outcome), (2) should customers attain their goal, they are more likely to be satisfied with the service, and (3) compliance itself leads to satisfaction Satisfaction is a favorable response to an outcome (in this case, the weight-loss program) A detailed discussion of the model elements follows

Provider Characteristic: Expertise

Expertise entails having a special skill or knowledge that represents mastery of a particular subject (Stewart 1989) Simons, Berkowitz, and Moyer (1970) suggest that the greater the expertise of a communicator, the greater is the change toward the position advocated Research in the sales literature (e g , Busch and Wilson 1976) supports the idea that experts are more influential than nonexperts In particular, in long-term buyer–seller relationships, the quality of the relationship is enhanced by seller competency (Crosby, Evans, and Cowles 1990) Thus, the communicator's expertise significantly affects audience reactions to persuasive communication

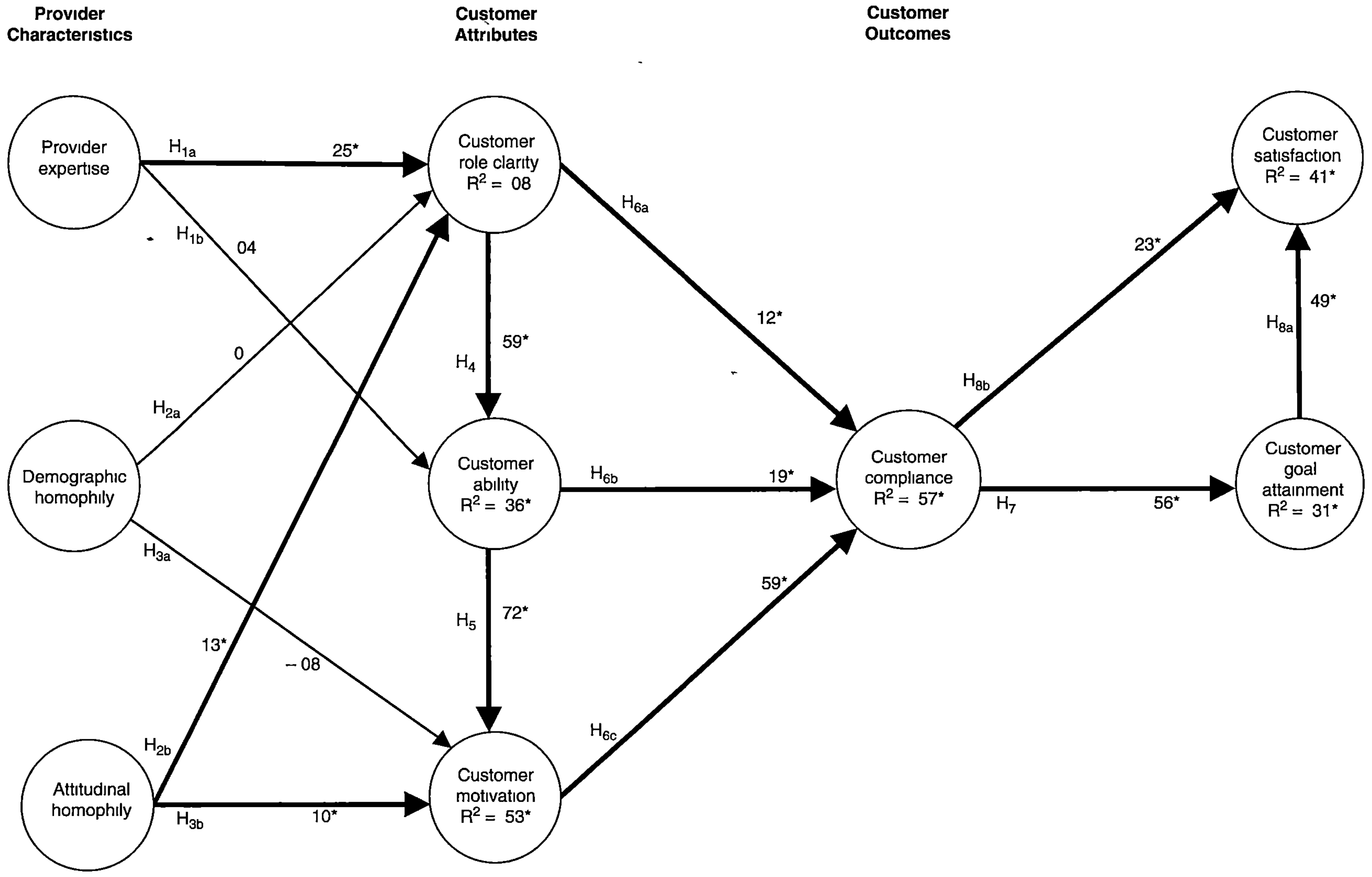
Expert providers can take a more active role in structuring the information environment and in clarifying the patient's role Better-educated nurses tend to have better critical-thinking skills (Tanner 2003) Weight-clinic patients need orientation to address such questions as "Why should I use a pedometer?" The greater the provider's knowledge or expertise about such customer questions, the more likely the provider is to influence positively the customer's role clarity and abilities Expert behavioral counselors can customize interventions with their patients to maximize their understanding of which changes must be made to lose weight successfully (Foreyt and Poston 1998) Customer education or training can take the form of formal orientation programs, written literature, and so on Lovelock and Young (1979) and Winslow (1992) suggest that such efforts play a role in helping consumers know which behaviors to adopt and how to perform them Although expert providers may also need such characteristics as communication skills and effort to affect customer attributes, the foregoing discussion supports the following hypothesis

> H_1 Increased service provider expertise results in customers having (a) greater role clarity and (b) greater ability to carry out their role

Provider Characteristic: Homophily

Homophily refers to the degree to which people in a dyad are similar on certain attributes, such as demographic variables, attitudes, beliefs, and values (Touhey 1974) The lit-

FIGURE 1
Estimated Latent Variable Model



*$p <$ 05

Notes Statistically significant relationships ($p <$ 05) are indicated by bold lines between constructs erature suggests that homophily promotes attitude change and/or cooperation in two ways by clarity of communication and by trust and liking In the first case, the literature indicates that when a greater degree of homophily exists between communicators (e g , between a medical expert and a patient), they are more likely to share common meanings for the messages they exchange (Rogers, Ratzan, and Payne 2001) Furthermore, when a target finds a source similar, the target is more likely to listen attentively to the source (Gotlieb and Sarel 1992) Simpson and colleagues (2000) suggest that when the receiver perceives him- or herself as similar to the source of the message, communication between the two is more effective in shaping or changing attitudes That is, communication is more accurate and efficient

In the second case, many researchers have noted that similarity leads to feelings of trust and respect (Simons, Berkowitz, and Moyer 1970) and to assumptions about common needs and goals (McGuire 1968) Crosby, Evans, and Cowles (1990, p 71) add that in goal-interdependent contexts, "similarity (particularly attitude similarity) may be a cue for expecting the other party to facilitate one's goals " In a review of the literature on motivation for health behavior, Carter and Kulbok (2002) identify variables that explain motivation across several studies, a variable they identify is "social support and approval " In a weight-loss clinic setting in which the consumer is assigned to one service provider, the provider is key in offering social support and approval Foreyt and Poston (1998) stress the importance of the health care provider's developing a collaborative relationship with the patient by using counseling and listening skills Such a relationship is easier to establish between homophilous parties

The theoretical support for the importance of demographic homophily has been consistent For example, Fischer, Gainer, and Bristor (1997, p 364) suggest that "in service settings where the customer expects to have extensive, repeated interactions" with the provider, customers may anticipate better service from demographically homophilous people because they are more comfortable interacting with them In many health care services, customer and provider interactions are extensive and repeated However, the empirical support for the salience of demographic homophily has been spotty (e g , Brown and Reingen 1987, Fishman 1995) In general, demographic variables are easy to obtain, whereas assessment of customer attitudes requires more effort on the part of the health care organization This study affords the opportunity to assess the importance of demographic and attitudinal homophily separately to determine whether demographic homophily is sufficient to influence customer attributes

To the extent that communication between homophilous nurses and patients is clearer and more efficient, we expect that role clarity will be enhanced The establishment of role clarity is mostly a matter of information and accurate communications, including receiver listening, and homophily can be expected to promote both of these Relatedly, similarity between nurses and their patients can be expected to enhance the patients' motivation to comply That is, homophily leads to relationships of liking and trust and therefore motivates the patient to cooperate in the weight-loss program Again, other provider characteristics, such as communication skills, may moderate the predicted relationships, but this discussion leads to the following hypotheses

H_2 Service provider–customer dyads that are (a) demographically homophilous and/or (b) attitudinally homophilous result in customers having greater role clarity to carry out their role

H_3 Service provider–customer dyads that are (a) demographically homophilous and/or (b) attitudinally homophilous result in customers having greater motivation to carry out their role

Customer Attributes: Ability, Role Clarity, and Motivation

The services marketing literature has focused on customer participation in the service organization, citing the role of customers in service creation For example, Bowen (1986) and Kelley, Donnelly, and Skinner (1990) suggest that service organizations view customers as quasi employees and manage their behavior in the service organization similarly to other employees However, the services marketing literature has not invested much effort in customer participation outside of the service organization, which is a requirement of many health care services

Bowen's (1986) model of the determinants of employee behavior in service performance supports the importance of the role clarity, ability, and motivation attributes in bringing about behavior change He suggests that these determinants may also prove useful for understanding *consumer* behavior in service production and delivery Bowers, Martin, and Luker (1990, p 62) suggest a three-step process to enhance customer participation that mirrors Bowen's attributes but also provides guidance as to the order of the variables "Step 1 Define the customer's job, Step 2 Train the customer to perform his or her job Step 3 Retain the valuable customer by rewarding the customer for a job well done " Thus, we expect that role clarity leads to ability, which in turn leads to motivation Patients who are not clear on what their role is in the process will be unable to acquire the needed skills to participate appropriately in the process Furthermore, patients without the ability to perform needed behaviors will become frustrated and will lose motivation Performance of the role will suffer if the role is not clear, even if patients are motivated and possess the ability to perform the role (Kearney 1978)

H_4 As customers gain role clarity, their ability to perform necessary behaviors increases

H_5 As customers gain the ability to perform appropriate behaviors, their motivation to do so increases

Compliance

For many health care services, service quality and customer satisfaction depend on the customer/patient complying with behaviors prescribed by the health care professional However, compliance to prescribed medical regimens is notoriously low Typically, adherence rates are only approximately 50% for prescribed medications, and compliance with instructions to lose weight or to stop smoking is much lower Long-term success rates on these lifestyle prescriptions are lower than 10% (Haynes, McDonald, and Garg 2002)

The literature on compliance is extensive, and research has been conducted in many fields, such as psychology, medicine, and consumer behavior Often, researchers focus on consumers' compliance with a specific onetime request, considering different ways that the request can be made, including vocal intensity and touch (Remland and Jones 1994), postcompliance touch as an incentive for performing a task (Nannberg and Hansen 1994), impression management strategies (Jackson and Latane 1981, Rind 1992), and the foot-in-the-door technique (Rind and Benjamin 1994) The health literature is less concerned with onetime requests and more concerned with behavior change over a period of time Fishman (1995) offers additional variables that are important to gaining compliance He posits that there is mounting evidence that the patient's family, friends, and social support system offer significant contributions to compliance and subsequent improved health Yet the variable that most consistently has been found to be associated with compliance is the patient–physician relationship

Without the requisite role clarity, ability, and motivation, compliance is less likely For example, Bostelman and colleagues (1994) find that between the time the patient is discharged from inpatient hospitalization and before the first appointment for outpatient treatment, many clients experience a personal or mental health crisis and need renewed connections with the health care system What comes into question is whether the crisis is due to the patient's lack of clarity regarding his or her role, the patient's inability to perform prescribed roles, and/or a lack of motivation to perform when the patient is away from the service organization

The health belief model (HBM) of compliance supports the predicted relationship between motivation and compliance (Becker 1976, Foxall, Barren, and Houfek 1998) The HBM was originally developed to explain preventive health actions (e g , vaccinations), but it has subsequently been applied in studies of compliance with medical regimens The HBM postulates that two key elements determine the likelihood of patients engaging in recommended health behaviors the patient's (1) readiness to take an action and (2) evaluation of the feasibility and efficaciousness of the action (Aalto and Uutela 1997) Cues (motivation) to act trigger readiness to take an action Cues can be internal (e g , discomfort associated with excess weight) or external (e g , advice from others, media campaign)

Moorman and Matulich (1993) find that ability and motivation affect consumers' health behaviors, though the influence depends on the health behavior being examined and the health ability characteristic being measured Jayanti and Burns (1998) include health motivation, knowledge, and what they call "consciousness," a construct similar to role clarity, in their model of preventive health behaviors In examining the influence of these three exogenous variables on preventive health behaviors, they find that only health motivation and consciousness are significant Thus, we predict the following

H_6 The greater the customer's (a) role clarity, (b) ability, and (c) motivation, the greater is the customer's compliance with service provider directives

Outcomes: Goal Attainment and Satisfaction

When service customers take responsibility for their service outcomes, there is a greater likelihood that they will achieve their goals (Bagozzi and Dholakia 1999) As a result of complying or taking part in the service delivery process, customers become empowered In so doing, the customer naturally becomes accountable for the performance of the activities involved in the service delivery process Mills, Chase, and Margulies (1983) indicate that customers not only are involved in their own goal achievement but also must accept some responsibility for their satisfaction with the ensuing results

As a result of complying with the role outside of the service organization, customers are expected to make progress on their goals, thus influencing their satisfaction with the service delivery process Although individual customers may have medical conditions that interfere with weight loss, when the customer complies with the service provider's guidelines, he or she is more likely to attain the goal The discrepancy between what is anticipated and what is received (i e , disconfirmation) has been shown to predict satisfaction (Oliver 1996) As such, the closer the outcome is to the desired goal, the more likely it is that the customer will be satisfied

Satisfaction is both a cognitive and an affective evaluation of the service experience (Mano and Oliver 1993, Westbrook 1987) We expect that the cognitive process of assessing goal attainment influences satisfaction directly In addition, the affective evaluation of the health care experience associated with compliance may enhance satisfaction Dubé, Bélanger, and Trudeau (1996) find that positive emotions are most important in patient satisfaction with medical care Furthermore, Dubé (2003, p 34) states, "Patient satisfaction is not only determined by cognitive expectations and perceptions of quality on a set of dimensions but also by the memories one has of the emotions experienced along the service process "

Kellogg, Youngdahl, and Bowen (1997) find that satisfaction is associated with several customer participation behaviors Similarly, Kelley, Skinner, and Donnelly (1992) find that satisfaction results from customers contributing to their own service quality Thus, we also expect that compliance influences satisfaction directly, because achievement of proximate behavioral goals may be satisfying even when the ultimate outcome goals are not attained Consumers may experience pleasure in the consumption process that leads to satisfaction independent of disconfirmation (Wirtz and Bateson 1999) This is particularly likely in health services in which the consumer is actively involved in the service encounter (Price, Arnould, and Deibler 1995) For example, Johnson and colleagues (2002, p 182) find that for some types of patients, "compliance with treatment [is] significantly associated with patient satisfaction "

H_7 The greater the customer's compliance with service provider directives, the greater is the customer's goal attainment

H_8 The greater the customer's (a) goal attainment and (b) compliance, the greater is the customer's satisfaction

Research Methods

Setting

The setting for this study was Lindora Comprehensive Weight Control, established in 1971 by Marshall B Stamper as a comprehensive, medically based weight-control program with clinics throughout Southern California As a comprehensive program, both the physiology and the psychology of the customer are addressed to promote permanent lifestyle change As a medically supervised program, the customers are guided by clinic nurses, who are either registered nurses (RNs) or licensed vocational nurses (LVNs)

Visits to the Lindora clinic are an essential part of the program The information and support provided exclusively by the customer's assigned nurse during each visit help the customer stay on task and motivated [1] The program comprises three phases weight loss, metabolic adjustment, and lifetime maintenance This study focuses on the weight-loss process During weight loss, customers' one-on-one visits provide counseling and medically based solutions to make dietary compliance more comfortable

Data Collection

We collected data using three methods Nurses and patients were asked to complete questionnaires, we obtained archival data, and a small group of nurses and patients were interviewed in depth

Participants and questionnaires Participants in the study included nurses and their assigned patients We drew samples from several of the Lindora clinics throughout Southern California A total of 376 patients (37 6% response rate) and 36 nurses (90% response rate) completed the questionnaires Surveys were distributed to 40 nurses across 18 clinics Nurses completed the survey independently and used a postage-paid envelope addressed to the researchers to return the survey A cover sheet attached to the survey requested nurses' identification to match them to their respective patients When matching was completed, the cover sheets were destroyed to maintain anonymity

Each nurse was asked to distribute the patient survey to approximately 25 patients Patients completed the survey without the supervision of the nurses and returned the survey using a postage-paid envelope addressed to the researchers A cover sheet attached to the patients' surveys requested the patients' and their nurse's identification for matching purposes When matching was completed, the cover sheets were destroyed to maintain anonymity

Archival data With patients' permission, Lindora also provided data from the records of 213 of the 376 patients in the study The data included the percentage of required visits made by patients to the clinic and the amount of weight lost by each patient Such data offer an objective view of customer compliance behavior (albeit narrowly defined) and goal attainment, respectively

Interviews On removal of the survey cover sheet, the names of patients and their nurses were noted as potential participants for in-depth telephone interviews Eight patient participants and nine nurse participants took part in the interviews In qualitative research, in general, data collection continues until no new insight is provided, McCracken (1988) suggests that usually eight participants are sufficient The first author conducted structured telephone interviews that lasted approximately 30 minutes each In general, participants declined to be recorded, thus, the first author took extensive notes

To better understand the quantitative results, interview questions of nurse and patient participants included, "What nurse characteristics or qualifications are needed to gain customer compliance with the weight-loss program?" "How did you get matched up with your nurse (patient)?" and "In what ways are you similar/dissimilar?" Additional questions were asked about the role the nurse played in clarifying the customer's role and in motivating and enabling the customer to adhere to his or her role Participants were also asked whether the program works

Measures

We measured provider expertise in three ways First, we measured customers' perceptions of providers' expertise using a five-item scale adapted from Bruner and Hensel (1994) (α = 99) Second, nurses were asked to report their credential "none, RN, or LVN" Third, nurses also reported their years "of experience in the field of nutrition and weight loss" We summed the five-item scale and properly modeled the indicators of the three potentially unrelated aspects of expertise as formative indicators of provider expertise

We measured demographic homophily using the four characteristics used previously by Brown and Reingen (1987) We gathered data on the sex, education, ethnicity, and age of patients We also asked patients for their perceptions of their provider on the same items We then calculated the similarity in the ratings across patient and nurse on each of the four demographic items using formulas such as age homophily = (–1) (absolute value of customer age – provider age), and gender homophily = same sex (1), different sex (0) Because we did not necessarily expect the four types of homophily to be correlated, we combined the four scores as formative indicators in the partial least squares (PLS) analysis (Diamantopoulos and Winklhofer 2001, Jarvis et al 2003)

We measured and modeled attitudinal homophily in an analogous manner, comparing patients' attitudes and patients' perceptions of nurses' attitudes across four separate seven-point items (see the Appendix) Questions about patients' attitudes appeared at the beginning of the questionnaire, and questions about patients' perceptions of nurses' attitudes appeared near the end of the questionnaire

We measured the customer attributes of role clarity, ability, and motivation using the patients' questionnaires

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[1] Support group meetings in which customers, led by a program counselor, share their dieting experiences are not an aspect of Lindora's program, thus, a single provider is the primary contact for the customer

For each of the three constructs, we developed six-item scales based on the six separate components of Lindora's weight-loss program (see the Appendix) Thus, we modeled each of the three constructs using a formative indicator approach, because we did not expect the six individual items to be correlated

The face validity of the role clarity, ability, and motivation measures was assessed through the ratings of expert judges Seven marketing-faculty judges independently assessed how well each of the items reflected the different dimensions of the customer attribute constructs (role clarity, ability, and motivation) Judges used the following rating scale 1 = "clearly representative," 2 = "somewhat representative," and 3 = "not at all representative" (Bearden, Hardesty, and Rose 2001) Because no item was rated a 3, we retained all 18 items

We operationalized compliance in two ways First, we used a nine-item scale on the patients' questionnaires to measure compliance Examples of the scale items include whether patients visited the clinic as instructed, followed the nurse's weight-loss directives, and kept a daily journal of their weight-loss program activities We devised scale items on the basis of discussions with Lindora's director of research about tasks expected of program participants The alpha coefficient for the compliance scale is 80, and we summed the nine items for use in the analysis Second, we supplemented self-report measures with a behavioral measure of compliance that was comparable to one of the scale items We obtained the percentage of required visits made to the clinic from Lindora [2] Because this archival measure focused narrowly on one aspect of compliance, we modeled the two compliance measures as a formative indicators for the PLS analysis

We also measured goal attainment, a customer outcome variable, in two ways First, we summed a four-item scale to measure goal attainment by asking patients whether they (1) are attaining, (2) think they will achieve, (3) are making progress toward, and (4) are not attaining their weight-loss goal ($\alpha =$ 86) Second, we measured goal attainment using company data on the actual percentage of each patient's weight loss [3] Because the customer self-report and archival data are different measures of the same construct, the two are properly combined as reflective indicators for the analysis

Finally, we measured the outcome variable, satisfaction, by asking patients about whether they were satisfied with the service (Lindora Comprehensive Weight Control) and the service provider (weight-loss nurse) and about their intention to enroll in the maintenance program on completion of the weight-loss program The scale used in the study consisted of nine items ($\alpha =$ 79) (Bruner and Hensel 1994), which we summed for the analysis Elimination of the item that measured intention to enroll in the maintenance program on completion of the weight-loss program improved the scale reliability ($\alpha =$ 85)

Pretest

Before collecting data for the study, we conducted a pretest to ensure the integrity of the data collection instrument and the mode of administration We conducted pretesting at a Lindora clinic that did not participate in the actual study The pretest sample consisted of three nurses and eight of each of their patients The pattern of answers from the pretest was sensible That is, the meaning of the questions intended by the investigators was the meaning that the respondents attributed to the questions (Hunt, Sparkman, and Wilcox 1982) In addition, the mode of administration was successful, we received all questionnaires within three days of distribution

Data Analysis

The statistical method we used to determine whether relationships exist between the model variables was PLS structural equation modeling, which entails a mathematically rigorous computation to determine the optimal linear relationships between latent (theoretical) variables The PLS method is perhaps the best analytical method for this study given the nature of the data and the measures The data consist of both formative and reflective indicators of the constructs The PLS method handles both types of indicators, whereas other path analytical methods (e g , LISREL, EQS) can handle only reflective indicators (Falk and Miller 1992)

We also performed qualitative analysis of the depth interview data, guided by the systematic approach to qualitative research in the work of Glaser and Strauss (1967) and Strauss and Corbin (1998) The theoretical model proposed for this study provided a framework for structuring the depth interviews We analyzed depth interview data by comparing and explaining the findings relative to the survey or quantitative results Triangulation of the different sources of data increases our confidence in the validity of our findings

Findings

The findings are summarized in Figure 1 The questionnaire data collected from patient and nurse respondents suggest that the groups are demographically similar Typically, the nurse was female, a college graduate, Caucasian, and a baby boomer (born between 1946 and 1964) In most cases, the patient was female, had some college education, and was Caucasian and a baby boomer Nurses were almost evenly split between RNs and LVNs The range of experience was 1 to 15 years, with a mean of 5 38 years For a summary of the 34 manifest (i e , directly measured) variables used in the model, see Table 1

Expertise

We found the path coefficient or direct effect of provider expertise on customer role clarity (25, $p <$ 05) to be as predicted in H_{1a}. Examination of the latent variable weights in Table 1 shows perceived expertise (the five-item scale) to be the most important among the three latent variables that define the construct provider expertise. The depth interviews of both the patients and the nurses revealed that in addition to expertise, experience was an important influence on role clarity as well. A patient reported:

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[2] The behavioral measure (percentage of visits that the patient made to clinic) and self-report measure (the scale item patient visited clinic as instructed) of compliance are weakly correlated, where r = 154 ($p <$ 05)

[3] The behavioral measure (percentage of weight loss by patient) and self-report measure (the scale item patient is attaining weight-loss goal) of goal attainment are correlated, where r = 349 ($p <$ 05)

> The nurses know the program "inside-out", they can point to specifics in the book when offering help. They can also provide alternative suggestions when a patient doesn't like a certain food.

The comments of nurses were consistent with this view:

> Nurses must have knowledge in the field of nutrition or in the medical field.
>
> Nurses must have experience dealing with different types of patients; different types of patients will require different treatment.

H_{1b}, which predicted that provider expertise influences customer ability (.04), was not supported.

Homophily

The direct effects of demographic homophily on customer role clarity (.0) and customer motivation (–.08) were not statistically significant. The direct effects of attitudinal homophily on customer role clarity (.13) and customer motivation (.10) were weak but statistically significant ($p <$ .05) (H_2 and H_3). To learn more about the role of similarity in gaining customer compliance, depth interview questions investigated whether patients and nurses perceived similarity as an important variable in customer compliance. Findings indicate that some patients perceived that they were similar to their nurses and that such similarity was important to compliance:

> The nurses have been through the program at my clinic; they know what relapse is like. They are not a bunch of size two people.
>
> If my nurse never had a weight problem, how could she really understand my struggle?

However, nurses did not necessarily believe that being similar to their patients was important in gaining compliance:

> I don't have any patients that are like me, and I get their compliance because of years of practice. You need to know personality types and mirror that to make them more comfortable and thus compliant.
>
> It is not necessarily easier to gain compliance with patients who are similar; it really depends on the patients' motivation; this will determine the patients' results. Being similar may actually hurt the outcome because patients may expect their nurse to go easy on them.

Ability, Role Clarity, and Motivation

H_4 and H_5 were supported. Role clarity influences the acquisition of ability (.59, $p <$ .05), and ability leads to motivation (.72, $p <$ .05). In addition, the direct effects of role clarity, ability, and motivation on compliance (.12, .19, .59, respectively) are statistically significant ($p <$ .05); thus, H_6 is supported. The extreme importance of motivation in gaining compliance was also noted in the interviews with nurses:

> Self-motivation is the number-one attribute the patient must have in order to comply with the program. People with the desire to change are the most successful people. Those that show up at Lindora and expect us to fix them are less successful.
>
> They must be committed and ready to do the program, willing to set goals, willing to follow instructions, motivated/determined to lose weight, interested, and enthusiastic.

Compliance

The direct effect of compliance on goal attainment is strong (.56) and statistically significant ($p <$ .05), in support of H_7. Patient informants strongly believed that Lindora's weight-loss program worked and that if the patient complied with the guidelines of the program, the patient was likely to attain his or her goal:

> The program works. I have to decide to do it. There is only so much Lindora can do; the ball is in my court.
>
> While the knowledge and support they gave me were important, ultimately, I did what I was supposed to do.

Nurse informants agreed:

> If patients follow the program, they'll lose weight.
>
> Oh yes, the program works. When they [patients] use the tools, weight loss is greater; when they [patients] don't use the tools, weight loss is slower or ceases.

Goal Attainment

H_{8a} is supported, and the direct effect of goal attainment on satisfaction (.49) is statistically significant ($p <$ .05). Both patient and nurse participants in the interviews suggested that if the patient achieved his or her goal, the patient was likely to be satisfied with the weight-loss program. As a patient stated, "Yes, I'm absolutely satisfied with the program because I reached my goal." In a similar manner, a nurse stated, "Patient goal attainment ensures satisfaction with the program." Customer compliance also had a direct (unmediated) effect on satisfaction, as H_{8b} predicted (.23, $p <$ .05).

The root mean square covariance between the residuals of the manifest and latent variables (RMS Cov [E, U]) of .04 indicates that the model fits the data quite well. This index reports the amount of correlation between the variables that is not accounted for by the model specifications. A coefficient greater than .20 is evidence of an inadequate model, and a coefficient of .02 indicates a superior model (Falk and Miller 1992).

Discussion and Implications

Although cross-sectional data limit the strength of inferences about causal connections, our findings suggest that the primary causal chain that runs through the model is the following: provider expertise → customer role clarity →

TABLE 1
PLS Loadings, Descriptive Statistics, and Correlation Matrix

Components and Manifest Variables	PLS LV Weights	Means	S D.	Correlation Matrix														
				3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Expertise																		
Expert	99	30 35	6 56	1														
Credential	24	60	49	– 077	1													
Years	08	5 38	3 26	023	– 115	1												
Demographic Homophily																		
Sex	40	12	32	090	– 049	009	1											
Education	85	1 18	1 00	006	028	– 018	047	1										
Race	– 22	35	48	– 035	– 109	060	– 018	– 033	1									
Age	– 21	1 29	1 00	– 042	115	– 161	016	046	– 011	1								
Attitudinal Homophily																		
Pills	27	1 20	1 25	023	– 049	– 056	– 031	– 041	– 007	055	1							
Surgery	– 29	1 31	1 21	061	– 029	– 035	– 116	025	– 025	– 027	270	1						
Dieting	– 68	1 02	1 29	004	004	– 076	– 033	079	019	042	123	120	1					
Diet + exercise	76	54	84	– 013	– 021	001	– 013	088	– 007	007	– 045	089	091	1				
Role Clarity																		
Activity	55	5 99	99	222	– 005	– 017	– 021	– 054	029	– 010	061	060	127	– 042	1			
Carbohydrates	28	6 31	78	156	015	021	– 059	013	043	– 080	– 006	010	090	– 045	368	1		
Diary	08	6 05	1 55	015	031	103	– 113	075	– 051	030	– 013	– 001	072	– 052	102	180	1	
Environment	38	5 71	1 34	134	071	– 011	093	052	– 029	021	– 076	– 023	– 012	– 095	217	286	070	1
No supplements	10	5 87	1 54	118	026	– 075	– 018	043	– 070	– 075	– 008	023	– 015	– 015	138	158	242	047
Yes supplements	12	6 03	1 06	170	025	– 077	– 023	– 045	– 021	– 017	035	002	031	– 049	447	339	163	236
Ability																		
Activity	19	5 88	1 13	066	050	046	– 102	– 012	019	– 010	099	039	– 039	034	342	126	039	070
Carbohydrates	24	6 11	92	111	045	049	– 016	018	024	– 062	– 003	020	059	– 040	246	565	089	164
Diary	36	5 69	1 56	082	045	047	008	– 024	– 006	– 079	022	009	– 022	019	220	218	097	084
Environment	48	5 93	1 00	139	– 030	004	069	– 004	– 006	– 063	– 065	– 029	035	010	242	414	– 013	484
No supplements	14	6 21	1 10	108	067	068	– 109	043	– 020	– 066	– 089	– 003	– 046	– 050	063	154	249	011
Yes supplements	18	6 12	1 08	192	021	072	036	– 021	100	– 080	– 014	– 088	– 022	– 088	147	204	046	059
Motivation																		
Activity	35	5 82	1 13	067	093	096	– 056	– 036	– 016	065	– 008	032	– 063	– 109	280	159	018	163
Carbohydrates	26	5 91	1 15	034	121	027	– 088	– 150	013	023	013	028	145	– 039	246	404	051	153
Diary	35	4 91	1 88	036	– 014	046	000	005	053	025	075	046	028	– 011	192	141	142	167
Environment	33	5 88	1 00	178	023	008	044	– 054	011	– 036	– 063	– 032	077	– 047	238	446	036	414
No supplements	12	5 50	1 75	093	004	– 023	021	019	009	– 044	– 072	040	– 021	– 001	126	059	223	125
Yes supplements	22	5 35	1 48	076	014	011	– 041	– 009	– 005	– 038	– 110	– 005	011	– 067	120	116	128	162
Compliance																		
Subjective	1 00	51 08	7 47	173	060	130	015	– 081	055	043	– 045	027	036	– 007	411	343	137	324
Percentage visits	01	82	21	– 041	191	– 033	– 076	091	009	100	– 035	– 009	070	089	003	040	000	119
Goal Attainment																		
Subjective	95[a]	23 41	3 44	066	040	096	048	– 129	073	– 059	– 037	– 019	026	– 015	220	393	099	266
Percentage weight loss	63[a]	10	05	– 008	004	032	– 061	033	133	– 123	– 030	000	146	091	096	247	017	131
Satisfaction																		
Satisfied	1 00	51 57	4 39	187	– 021	085	115	– 084	– 014	– 011	– 008	036	070	– 079	296	436	073	399

TABLE 1
Continued

Components and Manifest Variables	PLS LV Weights	Means	S D	Correlation Matrix																		
				18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Expertise																						
Expert	99	30 35	6 56																			
Credential	24	60	49																			
Years	08	5 38	3 26																			
Demographic Homophily																						
Sex	40	12	32																			
Education	85	1 18	1 00																			
Race	−22	35	48																			
Age	−21	1 29	1 00																			
Attitudinal Homophily																						
Pills	27	1 20	1 25																			
Surgery	−29	1 31	1 21																			
Dieting	−68	1 02	1 29																			
Diet + exercise	76	54	84																			
Role Clarity																						
Activity	55	5 99	99																			
Carbohydrates	28	6 31	78																			
Diary	08	6 05	1 55																			
Environment	38	5 71	1 34																			
No supplements	10	5 87	1 54	1																		
Yes supplements	12	6 03	1 06	251	1																	
Ability																						
Activity	19	5 88	1 13	073	178	1																
Carbohydrates	24	6 11	92	075	173	282	1															
Diary	36	5 69	1 56	183	122	177	279	1														
Environment	48	5 93	1 00	073	243	154	341	333	1													
No supplements	14	6 21	1 10	184	102	103	153	260	128	1												
Yes supplements	18	6 12	1 08	171	381	286	344	172	202	249	1											
Motivation																						
Activity	35	5 82	1 13	036	112	329	214	220	248	096	132	1										
Carbohydrates	26	5 91	1 15	−023	121	178	503	337	294	064	204	352	1									
Diary	35	4 91	1 88	020	063	167	260	502	205	196	085	180	358	1								
Environment	33	5 88	1 00	090	240	146	407	265	739	180	257	332	416	280	1							
No supplements	12	5 50	1 75	197	287	040	049	146	089	201	176	095	065	191	110	1						
Yes supplements	22	5 35	1 48	085	340	−025	044	−025	137	040	226	110	063	056	126	616	1					
Compliance																						
Subjective	1 00	51 08	7 47	134	304	293	404	449	492	233	289	505	494	498	536	329	313	1				
Percentage visits	01	82	21	−056	002	−035	028	−060	088	−112	−003	−006	−007	−044	022	079	074	088	1			
Goal Attainment																						
Subjective	95[a]	23 41	3 44	119	239	174	376	451	560	221	236	366	428	304	504	192	089	559	067	1		
Percentage weight loss	63[a]	10	05	162	012	101	255	151	191	−027	−005	133	248	164	165	111	036	267	427	349	1	
Satisfaction																						
Satisfied	1 00	51 57	4 39	085	332	133	359	271	590	189	241	297	404	215	557	153	160	499	041	651	224	1

[a] Latent variable (LV) loading coefficients for reflective indicators Communality coefficient = 36
Notes S D = standard deviation

customer ability → customer motivation → customer compliance → goal attainment → customer satisfaction These findings have important implications for both researchers and practitioners, and we subsequently discuss these in detail

Provider Characteristics

The findings empirically confirm Swartz's (1982) proposition that expertise is a key characteristic of influencing agents Expert providers are more likely to influence customer role clarity The expertise measure that is most important in influencing the customer is the customer's perception of the provider's expertise Thus, if customers believe that the provider is an expert, they will tend to heed the provider's instructions, which provides empirical evidence for Simons, Berkowitz, and Moyer's (1970) proposition that the greater the expertise, the greater is the change toward the position advocated by the communicator Organizations should consider ways to communicate staff expertise to their customers, such as including credentials in brochures and posting diplomas and certificates

We investigated both demographic and attitudinal homophily in this study Although the relationships of attitudinal homophily to customer attributes are statistically significant, they are weak The hypotheses about demographic homophily were not supported Whereas Brown and Reingen (1987) find that demographic homophily predicts consumer-to-consumer influence, the findings in this study are consistent with those of Fishman (1995), who indicates that demography does not appear to be a strong predictor of influence These results may be partly explained by providers' and customers' demographic similarity (e g , age, sex, race) in ways that are less meaningful or important to influence An additional problem may be that there was limited variation on the demographic characteristics of consumers and providers in the sample More research on this construct is needed in the context of influence processes Provider expertise and homophily may be required but not sufficient to bring about customer role clarity, ability, and motivation Further research should examine moderating variables such as communication skills and motivation

Customer Attributes and Compliance

Compliance is the central construct in this research Bowen (1986) suggests that customer participation in the service process is facilitated when customers have the ability and are clear about their role and motivated to perform as expected We extend Bowen's work by empirically determining that these variables are antecedents of compliance with prescribed regimens when customers are expected to continue to perform beyond the face-to-face exchange (i e , without the direct input of service providers) In addition to determining that these variables are antecedents of compliance, we also determined the nature of the relationships among the variables (i e , that role clarity leads to ability, which in turn leads to motivation)

The qualitative data were valuable for further exploration of motivation in relation to gaining compliance For example, a patient stated, "Motivation is number one, skills are important but if you are not motivated, you won't do it " Nurse participants also indicated that customer motivation is the key and that it must come from within the patient For example, a nurse stated, "If the patient is not self-motivated, I can't give him or her motivation, the learning process, however, may lead to motivation " Our results strongly support this observation, role clarity and ability lead to motivation

Theories of motivation (e g , self-efficacy, goal setting, attribution, expectancy value, social cognition) largely focus on *beliefs* about competency and expectancy for success, *values* as to why people engage in different activities, and how *goals* influence self-efficacy and performance The Latin root of the word "motivation" means "to move", thus, the study of motivation is the study of action (Eccles and Wigfield 2002) However, these theories do not indicate the attributes that are necessary for a person to move or to act Kuhl (1987) indicates that many motivational theorists assume that motivation leads directly to outcomes He posits instead that motivational processes lead only to the decision to act Our study builds on these theories by identifying specific customer attributes (role clarity, ability, and motivation) that promote or lead to acting or complying

Goal Attainment and Satisfaction

In this study, we determined that compliance leads to goal attainment Although this finding is intuitive and not surprising, it is an important result Mills, Chase, and Margulies (1983) suggest that as a result of taking part in the service delivery process, the customer becomes accountable for the performance of the activities involved in the process, including goal achievement Because compliance decreases as the duration of the regimen increases, providers can reassure or impress on consumers during periodic meetings that if they stick with the program, they will realize their goal

The finding that goal attainment leads to satisfaction is somewhat less intuitive in the context of health services Customers' having to give up an enjoyable habit (e g , eating junk food) could easily have an adverse impact on satisfaction The unhealthful habit likely yields immediate gratification, whereas the healthful behavior does not bear fruit until sometime in the future Consequently, it is easy to realize how consumers might not have a sense of satisfaction from having attained their goal given the sacrifice to realize it Oliver (1996) indicates that disconfirmation, the discrepancy between what is anticipated and what is received, is a predictor of satisfaction In support of Oliver's theory, the relationship between goal attainment and satisfaction was strong, which indicates that when goals are attained, customers are satisfied

Although we found compliance to lead to goal attainment, compliance was also directly related to satisfaction The act of complying with the service provider's instructions perhaps strengthens the relationship between patient and provider, thus creating a more satisfying relationship Foreyt and Poston (1998) recommend that behavioral counselors in obesity treatment programs develop a collaborative relationship with the patient by using counseling and listening skills, thus improving the patient–provider alliance Further research is needed to determine whether the interaction with the service provider contributes to satisfaction or whether the compliance behavior itself is satisfying to customers Both are likely to contribute, because the relationship between provider and customer is focused on the required behaviors

Contribution

Extant literature in the fields of consumer behavior, psychology, and medicine is replete with compliance-gaining research that focuses on source actions (e g , foot-in-the-door, door-in-the-face, vocal intensity, touch) that are useful in gaining compliance with onetime requests and when the provider and customer are in a face-to-face encounter (Dellande and Gilly 1998) Although source actions have been examined in these onetime compliance requests, we contribute to the literature by considering source characteristics that are useful in gaining compliance in services that are long-term in nature and when the customer is not in the presence of the provider Furthermore, the framework of this study contributes to the literature in that it more completely examines compliance behavior by including the role of the provider, the role of the customer, the compliance process, and postcompliance outcomes

The findings of the study reveal important drivers of customer satisfaction in the studied health care services setting Provider expertise leads to customer role clarity, ability, motivation, compliance, goal attainment, and satisfaction Of particular salience is the testing and sorting out of the relationships among the three customer attributes described by Bowen (1986) Moreover, managers may find it useful to monitor the three customer attributes to determine customer "readiness" (Ostrom 2003) and to make customer selection decisions accordingly (at least in non-life-threatening situations) The hypothesized model provides an excellent "nomological net" in which to demonstrate the theoretical usefulness of the concept of compliance In addition, as we expected, compliance appears to be a key link in the causal chain investigated Although all important factors in the causal chain are worthwhile for managers to monitor, the results of this study suggest that compliance deserves special attention That is, role taking and consumer diaries may be important tools in maximizing consumer goal attainment and satisfaction Indeed, rewards might be structured for both provider personnel and customers on the basis of such compliance measures

Conclusion

Although customer noncompliance in health care–related services can have life-and-death ramifications, it is also important to consider services that are not related to health care Lack of compliance in such services that depend on customer compliance (e g , long-term financial planning, education, tax preparation, preventive auto maintenance) can also lead to adverse outcomes for consumers, organizations, and society For example, people who use tax-preparation services but do not keep accurate records or receipts often do not qualify for certain tax benefits In addition, failure to comply in this area may have other adverse outcomes such as owing unnecessary taxes and/or paying penalties Thus, our research has implications beyond health care services

Appendix
New Scales: Attitudinal Homophily and Customer Attributes

Attitudinal Homophily (1 = "Disagree Strongly," 7 = "Agree Strongly")

It is okay to use diet pills to attain ideal weight

It is okay to have plastic surgery (e g , liposuction) to attain ideal weight

Dieting alone is sufficient to manage weight

It is necessary to include exercising along with dieting to manage weight

Role Clarity (1 = "Disagree Strongly," 7 = "Agree Strongly")

My weight-loss program has not made it clear how to keep a diary of my daily food/beverage intake (reverse coded)

My weight-loss program has made it clear how to determine my daily intake of carbohydrates

My weight-loss program has made it clear the number of prepackaged food supplements to take each day

My weight-loss program has made it clear how to determine my daily level of physical activity

My weight-loss program has not made it clear how to take the prepackaged food supplements (reverse coded)

My weight-loss program has made it clear how to control my environment

Ability (1 = "Disagree Strongly," 7 = "Agree Strongly")

I am not able to determine how to take the prepackaged food supplements (reverse coded)

I am able to determine the number of prepackaged food supplements to take

I am able to determine my daily level of physical activity

I am able to determine my daily intake of carbohydrates

I am able to apply the skills my nurse has taught me to help control my environment

I am not able to keep a diary of my daily food/beverage intake (reverse coded)

Motivation (1 = "Disagree Strongly," 7 = "Agree Strongly")

I feel motivated to take the prepackaged food supplements prescribed by the program

I feel motivated to determine my daily level of physical activity

I feel motivated to calculate my daily intake of carbohydrates

I do not feel motivated to take the prepackaged food supplements that are suggested (reverse coded)

I do not feel motivated to keep a diary of my daily food/beverage intake (reverse coded)

I feel motivated to apply the skills my nurse has taught me to help control my environment

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Jill Gabrielle Klein, N. Craig Smith, & Andrew John

Why We Boycott: Consumer Motivations for Boycott Participation

Although boycotts are increasingly relevant for management decision making, there has been little research of an individual consumer's motivation to boycott Drawing on the helping behavior and boycott literature, the authors take a cost–benefit approach to the decision to boycott and present a conceptualization of motivations for boycott participation The authors tested their framework during an actual boycott of a multinational firm that was prompted by factory closings Consumers who viewed the closures as egregious were more likely to boycott the firm, though only a minority did so Four factors are found to predict boycott participation the desire to make a difference, the scope for self-enhancement, counterarguments that inhibit boycotting, and the cost to the boycotter of constrained consumption Furthermore, self-enhancement and constrained consumption are significant moderators of the relationship between the perceived egregiousness of the firm's actions and boycott participation The authors also explore the role of perceptions of others' participation and discuss implications for marketers, nongovernmental organizations, policymakers, and researchers

> The boycott is the way we take our cause to the public For surely if we cannot find justice in the courts of rural California, we will find support with our brothers and sisters throughout the nation
>
> —Cesar Chavez (qtd in *Why We Boycott* [United Farm Workers of America 1973])

> We've taken significant actions to improve the lives, opportunities, and working conditions of the people who make our product around the world, and [we] regularly invest in the communities where we do business And we do this so that consumers can buy Nike products with the knowledge that these products have been manufactured under safe and fair working conditions
>
> —Nike's response to criticism in Naomi Klein's *No Logo* (Nike 2000)

Boycotts are an intriguing form of consumer behavior They are unwelcome to marketers yet consistent with the marketing concept, because firms targeted by a well-supported consumer boycott have apparently failed to sustain a sufficient customer focus As a result of greater public attention to corporate social responsibility (CSR) and the increased vulnerability of brands and corporate reputations, boycotts have become ever more relevant for management decision making Furthermore, given that they represent a source of consumer power and a mechanism for the social control of business, boycotts also have public policy implications Boycotters deliberately use their "purchase votes" to favor firms with preferred societal impacts, consistent with the idea of consumer choice as a rationale for capitalism (Dickinson and Hollander 1991, Smith 1990) Yet there has been little research into the factors that influence a consumer's motivation to boycott, despite the need for marketers, boycott organizers, and policymakers to better understand these factors

Friedman (1985, p 97) defines a consumer boycott as "an attempt by one or more parties to achieve certain objectives by urging individual consumers to refrain from making selected purchases in the marketplace" The "urging" of a boycott typically comes from a nongovernmental organization (NGO) that is protesting corporate practices Thus, boycotts are an extreme case of a broader category of consumer behavior in which social and ethical issues, such as environmentalism, influence purchase decisions Therefore, a better understanding of boycott participation not only is useful in its own right but also is likely to inform the understanding of ethical influences on buyer behavior in general

Consumer boycotts date back at least as far as the fourteenth century and have contributed to some spectacular successes for relatively powerless groups In the United States, boycotts were the key to unionization (Wolman 1916), and the 1955 Montgomery bus boycott marks the beginning of the modern civil rights movement (Friedman 1999) Elsewhere, examples include Gandhi's boycotts of British salt and cloth before Indian independence and the British boycott of Barclays Bank before its withdrawal from apartheid South Africa (Smith 1990) In the 1990s, the business press agreed that boycotts were often successful and were occurring more frequently (e g , *The Economist* 1990) [1] Recent prominent consumer boycotts include the

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[1] The incidence of boycotts and their success are inherently hard to quantify because of difficulties in identifying calls for boycotts by NGOs and the understandable reluctance of firms to report sales declines due to boycotts or to publicize concessions to boycott organizers

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European boycott of Shell because of its plan to sink the Brent Spar oil platform at sea and the multicountry boycott of Nike over alleged sweatshop conditions at Asian suppliers As these examples suggest, boycotts today are more typically focused on corporate practices rather than on broader sociopolitical goals such as civil rights This shift in boycott focus reflects both the increased power of the modern transnational corporation and, paradoxically, the heightened vulnerability of corporate reputation and brand image, and it is consistent with recent findings that a firm's CSR record affects consumer perceptions of the firm's brands and products (Brown and Dacin 1997, Sen and Bhattacharya 2001) It is with such a context in mind that we develop and test a conceptualization of motivations for boycott participation

Motivations for Boycott Participation

Table 1 summarizes prior research on consumer boycotts Most boycott studies have been conceptual or descriptive (case studies), with a focus on boycott organizers and targets rather than on the consumer Only two studies have reported empirical research that focuses directly on variables that influence an individual consumer's boycott decision Kozinets and Handelman's (1998) netnographic study suggests that boycott participation represents a complex emotional expression of individuality and a vehicle for moral self-realization Sen, Gurhan-Canli, and Morwitz (2001) test a theoretical framework that proposes that a fundamental question underlies a consumer's decision to boycott Will the boycott be successful? They find that consumers' participation decisions are influenced by their perception of the likelihood of the boycott's success, their susceptibility to normative social influences (social pressure), and the costs associated with boycotting

Sen, Gurhan-Canli, and Morwitz (2001) conceptualize boycotts as social dilemmas, wherein a consumer chooses between the individual benefit of consumption and the wish of a collective to refrain from consumption so that all receive the shared benefits of a successful boycott Similarly, a theoretical economic model of boycotting by John and Klein (2003) treats boycott participation as a collective action problem, in which individual consumers' incentives to participate are limited by the knowledge that they are small relative to the market and by their opportunity to free ride on the boycotting of others

Consistent with the articles by Sen, Gurhan-Canli, and Morwitz (2001) and John and Klein (2003), we view boycotting as a form of prosocial behavior by which "actions [are] intended to benefit one or more people other than oneself—behaviors such as helping, comforting, sharing, and cooperation" (Batson 1998, p 282) This is broadly referred to as "helping behavior" Over the years, a substantial body of literature in social psychology has grown from initial analyses of emergency helping to a broad set of studies of helping in many different contexts, including nonemergency helping (Piliavin et al 1981, 1982), voting, volunteering, and charitable donations (e g , Chambre 1987, Piliavin and Charng 1990), blood donations (Piliavin and Callero 1999), and corporate philanthropy (Piliavin and Charng 1990) At its core, this research aims to understand when and why people apparently act against selfish interests for the good of others

Boycotting is a collective act similar to voting, which is a prosocial behavior in which the individual benefit appears to be limited, nonetheless, people go to the polls in large numbers (for a discussion of the collective action problem in voting, see, e g , Blais 2001, Downs 1957) In the early helping literature, helping typically was not viewed as a collective action problem, but as the literature has broadened in scope, it has incorporated cases (e g , voting) that involve collective action Likewise, some charitable contributions (e g , to local public goods, such as National Public Radio in the United States) are examples of collective action [2] Boycotting is also related to customer complaining behavior, though complaining typically is neither prosocial in intent nor collective In most cases, a complaint is a purely individual act that is completely independent of the behavior of others (Blodgett and Granbois 1992, Boote 1998) Nonetheless, the literature identifies one form of complaint as simply exit (i e , the consumer decides to shun the firm's product offerings in the future), which is akin to an individual act of boycott (Boote 1998, Hirschmann 1970) In addition, as with boycotting, there is a trigger event that prompts a dissatisfied customer to evaluate the relative costs and benefits of lodging a complaint (Blodgett and Granbois 1991, Singh and Wilkes 1991)

An explanation of helping that has received extensive empirical support over the past three decades is the arousal cost–reward model (see Dovidio et al 1991) According to this approach, when a potential helper encounters another person in distress, the helper interprets the seriousness of the situation and experiences arousal based on this interpretation In response, the helper assesses the potential costs and benefits of helping The higher the net benefit of helping (rewards minus costs), the more likely it is that help will be given Our approach to boycotting is similar Consumers encounter an initial trigger event (which we refer to as a firm's "egregious act") that engenders negative arousal In response, each consumer evaluates the expected costs and benefits of boycotting

Table 1 indicates that several costs and benefits of boycotting have previously been identified, but most have not been tested empirically Thus, drawing on the helping literature and the prior boycott literature, we conceptualize the decision to participate in a boycott as akin to the decision to help others in distress, to contribute to a charity, or to donate blood More specifically, we take a cost–benefit approach to our investigation of boycott participation Figure 1 depicts our model

Perceived Egregiousness

Consistent with the boycott literature (e g , Friedman 1999, Garrett 1987, Smith 1990, Smith and Cooper-Martin 1997),

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[2] As a technical matter, the case of a single helper can often be reformulated as a collective action problem in which there is a set of *potential* helpers who decide to help with some probability (Lynch and Cohen 1978) In the language of game theory, potential helpers might employ a "mixed strategy"

TABLE 1
Prior Research on Boycott Participation

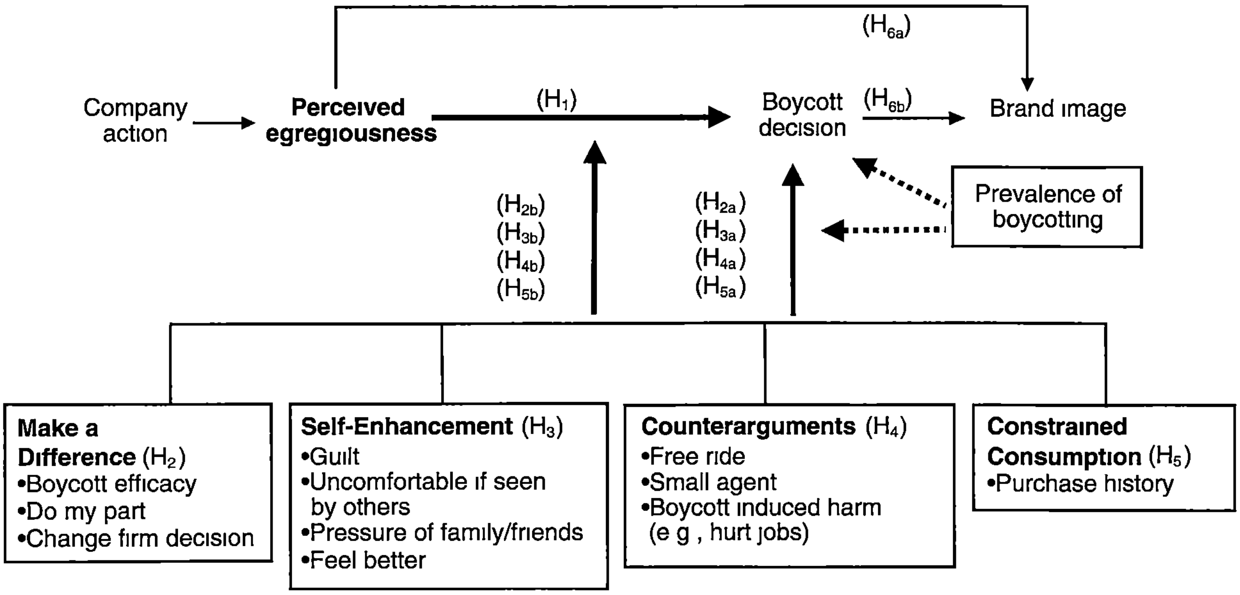
Author(s)	Orientation	Methodological Approach	Variables Influencing Boycott Participation[a]
John and Klein (2003)	Consumer behavior	Dynamic modeling	•Free-riding and small agent issues •False consensus •Expressive and instrumental motivations
Sen, Gurhan-Canli, and Morwitz (2001)	Consumer behavior	Experiments (laboratory studies)	•Perception of boycott success likelihood (as a function of expectations of overall participation, perceived efficacy of participation, message frame of pro-boycott communications) •Susceptibility to normative social influences (internal and external social pressure from boycotting reference group) •Costs of boycotting (preference for boycotted product and access to substitutes)
Friedman (1985, 1991, 1995, 1999)	Consumer policy and activism	Multiple methods: historical research (price increase boycotts, 1900–1970), secondary sources (media reports of U.S. boycotts, 1970–1980), and survey research (with boycott organizers)	•"Valence" (consumers care about the boycott issues and objectives, issue is exciting/engaging, consumer anger and desire for justice or to punish target) •Ease of participation (target easy to identify, few brand names, few competing boycotts) •No adverse consequences (extent of sacrifice, substitutes readily available and acceptable) •Social pressure
Kozinets and Handelman (1998)	Consumer behavior	Ethnographic (netnographic data collection from active boycotters)	•Seeking widespread social change •Moral self-expression •"Individuation" (coming to selfhood and self-realization) •Express uniqueness (differentiate from the crowd) •"Cleansing" (free from guilt)
Smith (1990)	Consumer policy and activism	Case studies (of ongoing boycotts based on interviews with boycott organizers and targets as well as secondary sources)	Consumers must be concerned, willing, and able to boycott. More specifically: •Consumer characteristics (aware of boycott, "moral outrage" over issue, perceived consumer effectiveness) •Issue characteristics (right issue at right time, understanding of and sympathy for cause) •Product characteristics (connection with issue, low cost, frequently purchased, visibility of purchase/consumption) •Product substitutability (availability of alternatives, consumer preferences)
Witkowski (1989)	Consumer behavior	Historical research (colonial nonimportation movement)	Political and moral values (force repeal of tax laws, patriotism, rejection of materialism) •Availability of substitutes •Social pressure •Guilt •Sacrifice (inferior alternatives or abstention)

TABLE 1
Continued

Author(s)	Orientation	Methodological Approach	Variables Influencing Boycott Participation[a]
Garrett (1987)	Marketing management	Survey research (boycott targets and organizers) and secondary sources (media reports)	•Potential participants' awareness of the boycott •Whether participant attitudes are consistent with boycott goals •Participant values •Cost of participation •Social pressure •Credibility of boycott leader
Miller and Sturdivant (1977)	Consumer behavior	Survey research (during boycott)	•Potential participants' awareness of the boycott •Attitudes toward consumers' social responsibility
Mahoney (1976)	Consumer behavior	Survey research of full versus partial boycott supporters (in advance of boycott start)	•Expectations of success •Participant alienation (less perceived powerlessness) •Participant values ("future world" orientation)

[a] Only John and Klein (2003), Sen, Gurhan-Canli, and Morwitz (2001), and Kozinets and Handelman (1998) focus directly on variables that influence a consumer's boycott decision Other research cited does not focus directly on variables that influence boycott participation, but such variables can be reasonably inferred from the investigation reported

FIGURE 1
Motivators of Boycott Decisions



our starting point is the observation that, in general, boycott participation is prompted by the belief that a firm has engaged in conduct that is strikingly wrong and that has negative and possibly harmful consequences for various parties (e.g., workers, consumers, society at large). Typically, this perception varies across consumers. Some will consider the firm's actions seriously wrong, whereas others will be less likely to do so, just as people in helping situations often have different interpretations of whether the scenario they witness is serious enough to precipitate intervention (Latane and Darley 1968; Schwartz 1977). To test this idea, we conducted a preliminary study using materials that promote the long-standing boycott of Nestlé over its marketing of infant formula in developing countries. Perceived egregiousness differed across consumers and predicted both boycott participation and a more negative brand image (Klein, Smith, and John 2003). Accordingly, we propose that the level of perceived egregiousness has a direct impact on boycott participation.

H_1: Consumers who find the firm's actions to be more egregious are more likely to boycott.

However, not all consumers who view the firm's actions as egregious will participate in the boycott. In our preliminary study, 70% of participants rated the problematic company practice at or above the midpoint on a composite seven-point scale measure of egregiousness, but only a minority (45%) said that they would definitely or probably boycott Nestlé. Thus, we ask, Why do people not participate in boycotts in response to perceived egregious conduct? From this perspective, our goal is as much to explain why some people do *not* boycott as it is to explain why others do.

Answers to open-ended questions suggested that boycotters often had multiple and different motivations for participation, which reflected perceived costs or benefits of participation. Drawing from economic and psychological theory, especially the cost–reward model of helping, and from our preliminary study and the boycott literature, we propose four different categories of motivations: make a difference, self-enhancement, counterarguments, and constrained consumption (Figure 1).

Benefits and Costs

Make a difference. The motivation to bring about societal change by participating in a boycott reflects perceived benefits of boycotting. Boycotters may have an instrumental motivation to change the target firm's behavior and/or to signal to the firm and others the necessity of appropriate conduct (Friedman 1999; Kozinets and Handelman 1998). Such motivation is typically tempered by a general "willingness to boycott," influenced by perceived consumer effectiveness, that affects a consumer's participation in any specific boycott (Smith 1990). Likewise, Sen, Gurhan-Canli, and Morwitz (2001) refer to "perceived efficacy" as the extent to which a consumer believes that each boycott participant can contribute to the achievement of collective goals, and John and Klein (2003) discuss how an exaggerated view of effectiveness might explain why people boycott when the target is unlikely to notice. All this research is consistent with findings that people are more cooperative in social dilemmas if they expect that the group will attain its goals (Wiener and Doescher 1991). It is also consistent with research that shows that helping is more likely when potential helpers believe themselves competent to help and have confidence that their actions will result in positive outcomes (e.g., Midlarsky 1984). Thus:

H_{2a}: Beliefs in boycotting to make a difference predict boycott participation. Consumers who believe that boycotting is appropriate and that it can be effective are most likely to participate in the boycott.

As is shown in Figure 1, we suggest that this and our other cost–benefit motivations directly affect boycott participation. For example, if a consumer believes that by boycotting he or she can change the firm's behavior, the consumer is more likely to boycott beyond the direct effect of egregiousness. We also propose that such motivations moderate the relationship between perceived egregiousness and the boycott decision. The effects of perceived egregiousness may be enhanced or diminished through interactions with the cost–benefit motivations. For make a difference, we expect that the relationship between egregiousness and boycotting is stronger for consumers who believe that boycotts can bring about change than for consumers who do not. This interaction can be inferred from John and Klein's (2003) theoretical boycott analysis and is consistent with helping studies in which perceptions of the seriousness of a situation have been shown to interact with perceived competence to help (Cramer et al. 1988). Furthermore, research on the relationship between environmental concern and related prosocial behaviors, such as recycling, has identified a moderating role for perceived consumer effectiveness (Berger and Corbin 1992; Ellen, Wiener, and Cobb-Walgren 1991).

> H_{2b}: Beliefs in boycotting to make a difference moderate the relationship between egregiousness and the boycott decision. When these beliefs are strongly held, the relationship between egregiousness and boycotting is greater than when the beliefs are less strongly held.

Self-enhancement. Although H_{2a} is consistent with Sen, Gurhan-Canli, and Morwitz's (2001) focus on the utility gained from boycott success, we suggest that in addition to such instrumental rewards, there are also intrinsic benefits from boycott participation, potentially regardless of boycott outcome. There is substantial evidence from the helping behavior literature that people's feeling good about themselves and being admired by others are key benefits of helping, whereas self-blame and public censure are consequences of not helping (Dovidio et al. 1991). Thus, our second category of cost–benefit motivations incorporates psychosocial variables that are associated with self-enhancement. Participation enables the boycotter to boost social and personal self-esteem either by associating with a cause or group of people or simply by viewing him- or herself as a moral person. Kozinets and Handelman (1998, p. 477) observe that boycotting seems to allow for a bettering that is "akin to a hygienically cleansing process." This comparison is reminiscent of Smith's (1990) notion that potential boycotters may believe that they are under a moral obligation to keep away from the company's products in order to have "clean hands."

Socially embedded expectations or social pressures are also likely to affect the guilt or positive feelings associated with boycotting. The relevance of social pressure for boycott participation is widely acknowledged in the boycott literature (Friedman 1999; Garrett 1987; Rea 1974; Sen, Gurhan-Canli, and Morwitz 2001) and in the helping literature (Dovidio et al. 1991).[3] Thus, self-enhancement through boycott participation includes the avoidance of feelings of guilt or the negative perceptions of others.

> H_{3a}: Self-enhancement factors predict boycott participation. The greater the perceived scope for self-enhancement (and avoidance of guilt or social censure), the more likely is a consumer to boycott.

We also expect that self-esteem moderates the relationship between egregiousness and boycotting, such that consumers who perceive an opportunity for self-enhancement are more likely to translate perceived egregiousness into boycott participation. Although to the best of our knowledge this interaction has not been investigated directly in the helping literature, there are helping studies that suggest that perceived egregiousness and self-enhancement motivations interact. For example, participants who are made to feel guilty are more likely to offer help in an unrelated situation to reduce their negative feelings (Carlsmith and Gross 1969), and participants' experience of a boost or threat to self-esteem affects perceptions of egregiousness (McMillen, Sanders, and Solomon 1977). Boycotting when egregiousness is high (equivalently, giving aid when and where it is most needed) presumably allows for the greatest degree of self-enhancement. Thus:

> H_{3b}: Self-enhancement factors moderate the relationship between egregiousness and the boycott decision. The greater the scope for self-enhancement, the greater is the relationship between perceived egregiousness and boycotting.

Counterarguments. Although there are benefits of boycotting, there are also costs. Helping studies show that as costs for helping increase, helping decreases. For example, Schwartz (1977) asserts that in the process of deciding to help another person in need, there is a "defensive step" of assessing potential negative outcomes of helping (e.g., injuring or embarrassing the person in need). Thus, a potential boycotter, even one who perceives the firm's actions as highly egregious, might refrain from participation if he or she believes that boycotting could lead to unintended harm. For example, consumers might not boycott sweatshop suppliers because the protest could hurt those it was intended to help.

Another type of counterargument pertains to the consumer's perception of whether his or her individual contribution will play any role in achieving the collective action goal. In this case, the counterargument pertains to the probability that the consumer's boycott decision will influence the firm's decision. There are two variations. First, boycotters might believe that their actions will have no impact because they are too small to be noticed (John and Klein 2003). This is analogous to the argument that there is no point in voting because any individual vote will almost surely not affect the outcome of an election. Similarly, helping often fails to occur because the potential helper believes that he or she is unable to intervene effectively, there is a sense of a powerlessness to change the victim's predicament Second, boycotters might believe that their actions are unnecessary because they can free ride on the boycott decisions of others In the helping literature, free-riding tendencies are examined in studies of "diffusion of responsibility," which find that the probability that a person will help someone in need is drastically reduced when others are also available to help (e g , Latane and Nida 1981) The cost–benefit model of helping suggests that this occurs because the costs for not helping (e g , guilt, worry about the victim) are reduced as a result of the expectation that the victim will receive help from others Similarly, although boycotts require widespread participation to be effective (i e , to reduce sales substantially), if the boycott is successful all will receive the benefits regardless of whether they participated Thus, some would-be participants might free ride[4]

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[3] People can learn that helping is a good and desirable behavior that is independent of social approval (or direct reward) and thus engage in self-reward. This has been shown to be important to the maintenance of long-term helping, such as repeated and regular blood donation (Piliavin et al. 1982).

> H_{4a} Counterarguments about boycotting are negatively related to boycott participation The more a consumer engages in counterarguments, the less likely is the consumer to boycott

We propose that counterarguments also moderate the relationship between perceived egregiousness and boycotting Conflict models of choice (Ajzen 1996) suggest that a decision (in this case, boycotting) will not be reached if a person feels powerless (small agent), shifts responsibility to others (free rides), or becomes concerned about potential consequences Decision making can be impeded even when the stakes (in this case, egregiousness) are high and can result in inaction even when the situation calls for action (Hogarth 1980) Analogously, increased egregiousness may fail to translate into boycotting if counterarguments loom large in the minds of consumers Thus

> H_{4b} Counterarguments about boycotting moderate the relationship between egregiousness and the boycott decision The stronger the counterarguments, the weaker is the relationship between perceived egregiousness and boycotting

Constrained consumption The direct cost of boycotting (i e , forgoing a preferred good) also factors into the consumer's boycott decision Boycotting is likely to be most costly for heavy users of the targeted company's products before the boycott because such consumers face the greatest constraint on their consumption if they participate in the boycott Thus, we anticipate that constrained consumption has a direct effect on boycott participation

> H_{5a} The degree to which consumption is constrained predicts boycott participation Consumers whose consumption is most constrained by boycotting are less likely to boycott

If the sacrifice required to help is sufficiently large, increased seriousness of the situation will not necessarily predict helping (Dovidio et al 1991) Similarly, egregiousness is more likely to be related to boycotting at lower levels of constrained consumption We predict that this relationship is weaker at high levels of constrained consumption because even high-egregiousness consumers may find it too costly to boycott Thus, the degree to which boycotting constrains consumers' consumption influences the effect of egregiousness on their boycott decisions

> H_{5b} The degree to which consumption is constrained moderates the relationship between egregiousness and the boycott decision There is a weaker relationship between egregiousness and boycotting for consumers who suffer the greatest constraint in their consumption

Estimated Participation of Others

Sen, Gurhan-Canli, and Morwitz (2001) and John and Klein (2003) suggest that perceptions of how many others are boycotting (estimated participation) also affect individual boycott participation Empirical work on social dilemmas (e g , Wiener and Doescher 1994) suggests that an increase in estimated participation is likely to lead to an increase in actual participation In the boycott context, there are many ways such an effect can operate For example, more people taking part may generate increased social pressure or may affect perceptions of boycott efficacy, when more people participate, an individual consumer may believe that his or her own boycotting is more likely to affect the outcome (because the consumer believes that the boycott is close to a "tipping point" at which the firm might well capitulate) Thus, in addition to a direct effect on boycotting, we might find that estimated participation moderates the effect of self-enhancement or make a difference

Another possibility is that estimated participation moderates constrained consumption When the direct cost of boycotting is high, people may be particularly averse to being exploited by others' free-riding (Sen, Gurhan-Canli, and Morwitz 2001, Wiener and Doescher 1991) and thus may be highly attuned to whether others are taking part Finally, higher estimated participation may *decrease* boycotting because it affects the incentive to free ride When more people participate, the boycott is more likely to be successful, and so the temptation to free ride increases (John and Klein 2003), this suggests that estimated participation could moderate our free-rider variable Thus, there are theoretical reasons that estimated participation might moderate all four factors However, the links are complex, thus, our analysis of this variable is more exploratory and lacks explicit hypotheses[5]

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[4] Although some of the counterarguments may appear to be simply the reverse of the make-a-difference motivation, analyses reveal that they are two distinct constructs This is consistent with findings in psychology that the positive and negative sides of the same attitude are often distinct (e g , Cacioppo and Berntson 1994)

[5] These arguments also imply the possibility of three-way interactions between estimated participation, egregiousness, and the variables that we discuss We do not search for such interactions here because our model is already complex This discussion also does not exhaust the possible ways that, as a matter of theory, estimated participation might affect boycotting For example, consumers might infer egregiousness from estimated participation Our data are not rich enough to distinguish among these potential effects

Brand Image

Consistent with our preliminary study, we expect that egregiousness affects brand image Consumers who believe that a firm has erred will have a more negative image of it than will consumers who do not judge its actions as egregious (see Dawar and Pillutla 2000, Smith and Cooper-Martin 1997)

> H_{6a} There is a direct relationship between egregiousness and brand image, the greater the perceived egregiousness, the more negative is the brand image

We also expect that boycotting damages brand image beyond the direct effects of egregiousness It is well established in social psychology that actions can intensify attitudes in the direction of the behavior Both cognitive dissonance theory (e g , Festinger 1957) and self-perception theory (e g , Bem 1972) predict that undertaking an action leads to behavior-consistent attitudes Thus, independent of egregiousness perceptions, consumers who boycott are likely to devalue their perception of the brand, simply because they boycotted

> H_{6b} The boycott decision mediates the relationship between egregiousness and brand image

Finally, the management of targeted firms often communicates with consumers to discourage boycott participation Thus, we also examine responses to messages intended to counter the boycott

Methods

The Bremmer Boycott

We tested our hypotheses in an empirical study of an actual, ongoing boycott This contrasts with the work of both Sen, Gurhan-Canli, and Morwitz (2001), who conducted a laboratory study (they informed subjects about an ongoing boycott and manipulated factors predicted to affect participation), and Kozinets and Handelman (1998), who examined Internet chat-room data (they selected sites for the prevalence of boycott discussions) Thus, ours is the first quantitative, consumer-focused study of an ongoing boycott in a natural setting[6] The advantage of this approach is that we capture real-time reactions to a boycott in the social milieu in which it occurred Although we lack the experimental control of the laboratory, we gain access to a real boycott, with all its inherent emotion and public controversy, without needing to elicit or simulate moral outrage in an artificial setting

The boycott in question was called against Bremmer (name disguised), a European-based multinational firm that sells consumer food products, primarily through grocery outlets The announcement of two factory closings occurred approximately one month before the start of data collection The closings were a major event that received extensive media coverage, and some consumers began to boycott[7] Two weeks after the announcement, Bremmer's chief executive officer was interviewed in the media about the closings A large demonstration at a factory closing was staged a week later, and a group of Bremmer employees and various pressure groups, including an NGO known for its campaigns against globalization, called for an official boycott Consumers were asked to boycott all the firm's products, but two product brands received the most media attention the brand made in the factories to be closed (Brand A) and Bremmer brand-name products made in other factories (Brand B) Bremmer had other brands, but only some consumers were aware of this

We had access to sales-tracking data for Brand A, which showed an 11% decrease in market share (i e , 11% of share in the three previous months) in the first two weeks following the announcement of the closings (before the boycott was "officially" called) Sales then recovered somewhat, but for the four months following the call to boycott, market share was down an average of approximately 4% No significant events occurred during the data collection period (the third to tenth weeks following the call to boycott), and market share remained lower and steady Sales did not recover to near their preboycott levels until five months after the boycott was announced

The Study

Our study was conducted by Bremmer's research agency, which used questions that we added to its corporate tracking surveys We did not have control over the exact wording or the format of the response scales (because of the need to maintain consistency with previous Bremmer tracking studies)

Subjects A nationally representative stratified random sample of 1216 adult consumers participated in the study through a telephone survey (response rate was 40%) Respondents were asked to participate in "a survey on some companies," and there was no reference during recruitment to Bremmer or to the boycott Interviews were conducted in two phases during the third and tenth weeks after the boycott was called Women constituted 52 6% of the sample, and the average age was 46[8]

Measurement Respondents were asked to indicate their opinion of the firm on a three-point scale (from "poor" to

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[6] Miller and Sturdivant (1977) study an actual boycott due to worker mistreatment, but they focus on the effect of one firm's actions on perceptions of an affiliated firm and do not examine consumer motivations for participation

[7] Our confidentiality agreement precludes direct identification of the boycott target, and thus we provide no citations here (although, in accordance with our agreement, we did identify the target to the reviewers of this article) The plant closures and resultant boycott were highly significant events that resulted in front-page newspaper articles and major coverage in other media The negative media coverage included the company's plant closures being described in the press as "brutal" and the company being depicted as a "symbol of corporate greed" because it was making closures even though it was profitable A government minister even decried the closures as "unacceptable"

[8] Professionals represented 12% of the sample, mid- to low-level managers and technicians, 15%, clerical workers, 11%, unskilled workers, 22%, and unemployed or retired, 32% A stratified sampling approach was taken to ensure that sample demographics matched those of the population

"very good") They were then asked whether they had heard about the factory closings ("There have been recent reports in the press about planned factory closings and job losses in the Bremmer group Have you heard about them?") They were also asked three questions that measured the perceived egregiousness of the closings Respondents were asked to rate their confidence (on a four-point scale of "no confidence at all" to "complete confidence") in the managers of Bremmer "to not close factories except when necessary" and "to ensure that the factory closings take place in the best possible way for the workers" A third question asked for agreement on a four-point scale to the statement, "Bremmer must close certain unprofitable factories to avoid putting its entire [product] line in danger"[9] Respondents were also asked whether they disapproved of Bremmer's actions

The next question asked about boycott participation, stating that there had been appeals to boycott Bremmer in reaction to the factory closings Respondents were given three possible responses "I am boycotting the products of Bremmer", "I am tempted to boycott, but I don't know if I will", and "I am not boycotting the products of Bremmer"[10] Respondents were also asked to estimate the percentage of Bremmer customers who were boycotting Bremmer products

We measured the hypothesized benefit and cost motivators on a ten-point scale (1 = "strongly disagree" and 10 = "strongly agree") Table 2 lists the questions and descriptive statistics for the make-a-difference, self-enhancement, and counterargument items We measured constrained consumption by previous purchase frequency, because heavy purchasers of Bremmer products would pay a higher price for boycotting than would light purchasers Respondents were asked how often, in general, they had bought the two focal brands (A and B), on a four-point scale (1 = "never or almost never," and 4 = "very often")

Bremmer management communicated two messages about the factory closings Three alternative jobs had been

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[9] In the media, much of the anger associated with the boycott was attributed to reports that Bremmer was closing factories despite being profitable overall

[10] This question was modified in a subsequent phase of the survey Interviewers first asked if the respondent was boycotting, if the answer was negative, they asked whether he or she was tempted to boycott

TABLE 2
Descriptive Statistics

		Means		
Variable	**Mean (s.d)**	**Nonboycotters**	**Tempteds**	**Boycotters**
Egregiousness	2 77 (81)	2 60 (81)	3 00 (66)	3 23 (75)
Make a Difference	4 51 (2 67)[a]	3 54 (2 23)	5 55 (2 36)	7 44 (2 06)
Boycotts are an effective means to make a company change its actions	4 76 (3 14)	3 96 (2 90)	5 48 (2 98)	7 17 (2 84)
Everyone should take part in the boycott because every contribution, no matter how small, is important	4 65 (3 21)	3 57 (2 80)	5 91 (2 68)	7 83 (2 68)
By boycotting, I can help change Bremmer's decision	4 14 (3 29)	3 10 (2 76)	5 20 (3 13)	7 34 (3 03)
Self-Enhancement	2 82 (2 15)[a]	2 21 (1 76)	3 41 (2 03)	4 75 (2 41)
I would feel guilty if I bought Bremmer products	3 27 (3 10)	2 48 (2 63)	4 07 (2 94)	5 76 (3 49)
I would feel uncomfortable if other people who are boycotting saw me purchasing or consuming Bremmer products	2 85 (2 91)	2 52 (2 71)	3 07 (2 75)	4 01 (3 49)
My friends/my family are encouraging me to boycott Bremmer	2 04 (2 31)	1 76 (1 94)	2 37 (2 58)	2 89 (3 09)
I will feel better about myself if I boycott Bremmer	3 08 (3 01)	2 04 (2 16)	4 14 (2 89)	6 24 (3 54)
Counterarguments	5 67 (2 23)[a]	6 25 (2 00)	5 10 (2 00)	3 84 (2 24)
I do not need to boycott Bremmer, enough other people are doing so	4 52 (3 32)	4 83 (3 37)	4 34 (2 95)	3 43 (3 25)
I do not buy enough Bremmer products for it to be worthwhile boycotting, it would not even be noticed	5 22 (3 35)	5 53 (3 37)	5 25 (3 07)	3 89 (3 21)
One shouldn't boycott because it will put other Bremmer jobs in danger	7 02 (3 05)	7 92 (2 63)	5 89 (2 82)	4 46 (3 09)
I don't boycott Bremmer because it is a (country) company and boycotting would lead me to buy foreign products	5 89 (3 47)	6 69 (3 29)	4 91 (3 11)	3 59 (3 28)
Constrained Consumption (Purchase History)	2 77 (75)[a]	2 88 (66)	2 80 (68)	2 27 (95)
Brand A (central)	2 61 (89)	2 70 (85)	2 60 (89)	2 27 (99)
Brand B (central)	2 93 (85)	3 06 (75)	3 00 (72)	2 28 (1 06)

[a] Descriptive statistics are for the average of the items within each factor
Notes s d = standard deviation

offered to each worker in the closing factories, and Bremmer was seeking other companies that would be willing to create jobs at the sites to be closed In the survey, respondents were asked whether they had heard these messages ("yes" or "no") and whether they were more sympathetic to the firm as a result of these initiatives, on a four-point scale (1 = "not at all" and 4 = "very")

Results

The Bremmer controversy was well publicized 95% of the sample had heard about the factory closings Overall, 67% of the sample were not boycotting, 17% were tempted to boycott, and 16% were boycotting Although respondents overwhelmingly disapproved (81%) of Bremmer's factory closings, most consumers who disapproved were nonboycotters (61%) Only 19% of disapprovers were currently boycotting, and 20% were tempted to boycott but had not yet done so For most consumers, disapproval of the firm's actions did not lead to boycotting

We averaged the three measures of egregiousness described previously (Cronbach's $\alpha = 73$) The mean egregiousness score was 2 79 (recall that responses to these questions were on a four-point scale, and thus higher numbers indicate greater egregiousness) Although 60% of the sample averaged three or higher on the scale, only 22% of this group boycotted (21% were tempted), which again indicates that not all consumers who view a firm's actions as wrong participate in a boycott[11]

A principal components analysis (PCA) with Varimax rotation of the cost–benefit (motivation) variables found four factors, as we predicted (Table 3) The PCAs conducted factor by factor revealed each factor to be unidimensional The most strongly endorsed items were the counterarguments, particularly the idea that boycotting would hurt other jobs and would lead consumers to buy foreign products The least strongly endorsed were self-enhancement items, particularly ones associated with social pressure As Table 2 shows, all motivations showed the expected differences across boycott groups (all *p*s < 001)[12]

TABLE 3
PCA with Varimax Rotation: Eigenvalues and Item Loadings

	Component			
	Make a Difference	Self-Enhancement	Counterarguments	Constrained Consumption
Eigenvalue	3 64	2 03	1 37	1 01
(% of Variance)	(28 01)	(15 59)	(10 57)	(7 78)
Boycotts are an effective means to make a company change its actions	**.851**	047	026	– 037
Everyone should take part in the boycott because every contribution, no matter how small, is important	**.753**	224	– 171	– 088
By boycotting, I can help change Bremmer's decision	**762**	361	– 093	– 018
I would feel guilty if I bought Bremmer products	286	**.724**	– 071	– 114
I would feel uncomfortable if other people who are boycotting saw me purchasing or consuming Bremmer products	137	**.712**	172	– 027
My friends/my family are encouraging me to boycott Bremmer	007	**.756**	059	042
I will feel better about myself if I boycott Bremmer	466	**648**	– 129	– 128
I do not need to boycott Bremmer, enough other people are doing so	105	070	**.731**	043
I do not buy enough Bremmer products for it to be worthwhile boycotting, it would not even be noticed	– 009	003	**.631**	– 240
One shouldn't boycott because it will put other Bremmer jobs in danger	– 310	– 089	**.632**	223
I don't boycott Bremmer because it is a (country) company and boycotting would lead me to buy foreign products	– 206	099	**.659**	264
Purchase history Brand A	– 030	– 013	049	**.831**
Purchase history Brand B	– 084	– 099	065	**.833**

Notes Numbers in boldface indicate variables included in component

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[11] Of participants in the sample who were high in egregiousness (scored three or higher) *and* who disapproved, 25 5% were boycotting, 20 2% were tempted, and 54 3% were not boycotting

[12] There were no substantial changes over time in the measures reported in Table 2, with the exception that the last wave of respondents gave higher ratings to the belief that "boycotts are an effective means to make a company change its actions" ($p < 05$), and there were fewer respondents who were tempted to boycott because they were more decided on boycott participation As a precaution, we included the time of interview as a control in our regression analyses

Regression Analyses

We first indexed our items according to our predicted factors Make a difference has a Cronbach's α of 78, and self-enhancement has a Cronbach's α of 73 We averaged the two purchase history questions as a measure of constrained consumption ($r = 485$, $p < 01$)[13] The counterargument items, while forming a clear factor in the PCA, had a Cronbach's α of only 61, we return to this issue subsequently

As Table 2 shows, the mean of each of the motivation variables is consistent with an equal interval dependent variable In each case, the mean for "tempteds" falls between the means for the nonboycotting and boycotting groups, equidistant or approximately equidistant from the two extreme means (This was the case across both phases of the data collection) We thus report simple ordinary least squares regression (i e , a linear probability model) in our analysis We also conducted analyses that do not require an interval-scaled dependent variable—specifically, discriminant analysis and ordinal (logit) regression—and we obtained similar results We centered predictor variables (raw score minus mean, Cohen and Cohen 1983)

Model A in Table 4 is our benchmark model It includes egregiousness and all the cost–benefit motivation factors as well as the interaction terms of each factor with egregiousness We included respondents' sex in the model (see the subsequent discussion) and added a dummy variable for the phase of data collection As H_1 predicts, egregiousness has a direct effect on boycotting, as do the four sets of cost–benefit factors There were significant interactions between egregiousness and self-enhancement and between egregiousness and constrained consumption The make a difference × egregiousness and the counterargument × egregiousness interactions are in the predicted direction but are not significant

Table 5 indicates the magnitude of the findings We use our data to predict how many people in our sample would have boycotted had egregiousness and our four factors been counterfactually lower or higher[14] For example, had our sample had higher egregiousness (such that mean egregiousness for the entire sample equaled the true mean level for the top third of the sample), we predict that 261 participants would have boycotted, which is a 45% increase from the original 180 Had constrained consumption also been low, we predict that 339 participants would have boycotted[15] Table 5 also illustrates the interaction effect Of this increase of 159 (= 339 – 180), we can attribute 50 (= 230 – 180) to the partial effect of the change in constrained consumption and 81 (= 261 – 180) to the partial effect of the change in egregiousness The remaining 28 (18% of the total change) are attributable to the interaction effect Our ordinal regression and discriminant analysis approaches yielded similar predictions and interactions

In Table 4, Models B–E, we examine the counterarguments in more detail Although the four counterarguments loaded on a single factor, they measure different objections to boycotting free-riding is not the same as refraining from boycotting because other jobs will be threatened Furthermore, Cronbach's α of 61 is less than the generally accepted cutoff of 70, which suggests that the items should perhaps be represented individually in the regression equation At the same time, the items are correlated with one another (as indicated by the factor analysis and by the r's ranging from 18 to 45), so the inclusion of all four items in a single equation presents collinearity problems We thus ran separate regressions (Models B–E) that included each counterargument in turn as an individual variable The counterargument variables all have significant direct effects on boycotting, and "too small" and "hurts jobs" show significant interactions with egregiousness All interaction terms are in the predicted direction[16]

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[13] If respondents answered the questionnaire appropriately, the purchase history questions should capture constrained consumption However, there are two mismeasurement issues that can arise First, consumers who never purchased Bremmer's products might decide to report themselves as boycotters, second, respondents might have misinterpreted the purchase history question as a question about their current purchases As a check, we also ran our analyses with the omission of consumers who reported never purchasing Bremmer's products, our results were essentially unchanged

[14] The low (high) values in Table 5 scale each score such that the mean score for the scaled variable equals the true mean for the lower (upper) third of the actual sample For example, consider egregiousness In our sample, the mean value of egregiousness is 2 77 The mean value for the lower third of the sample is 1 85 To construct low egregiousness, we scaled down the egregiousness score for our entire sample such that the mean for the constructed data is 1 85 Thus, we multiply everyone's score on egregiousness by a factor equal to approximately 1 85/2 77 = 668 (our actual scaling factor is slightly lower [663], because we truncated the data such that the minimum score is still 1) Likewise, to construct high egregiousness, we multiply all scores by a factor of 1 67, which ensures that the mean in our new constructed data equals the actual mean for the top one-third of the true data

We generated the predictions using the ordinary least squares regression as an indicator function for the respondents in our sample, using the true data for all variables except those noted Specifically, we used our original regression to identify a cutoff value between boycotting and being tempted to boycott (We could not simply sum the predicted probabilities because of the tempteds) Thus, the values in Table 5 should be interpreted as follows If consumers in our sample had, counterfactually, had proportionately higher egregiousness (such that mean egregiousness was equal to that of the top third of the sample), we predict that 261 would have been above the cutoff and would have boycotted Had they also had a higher score on make a difference (such that the mean was equal to that of the top third of the sample), our model predicts that there would have been more than 500 boycotters rather than 180

[15] Although the interpretation of a change in egregiousness is straightforward (the firm's actions could have been perceived as more egregious), a counterfactual change in a motivation is more complex One interpretation is that the strength of the motivations is indeed mutable for each participant Another interpretation is that different values of the motivations correspond to different subsamples of the population

[16] Although our analysis raises the possibility of misspecification bias, this appears to be limited given that the results for the rest of the model are similar in all five models in Table 4 In effect, the individual regressions provide an upper bound on the effect of each individual counterargument

TABLE 4
Regression Models A–E

	Model A· Four Factors			Model B: Three Factors + Free Ride			Model C: Three Factors + Too Small			Model D: Three Factors + Hurt Jobs			Model E· Three Factors + Country		
	b	t	*p*	b	t	*p*	b	t	*p*	b	t	*p*	b	t	*p*
Egregiousness	**.10**	**4 62**	**.00**	**.13**	**5.86**	**.00**	**.14**	**6.11**	**.00**	**.11**	**4.81**	**.00**	**.11**	**4.82**	**.00**
Make a difference	**.09**	**12.13**	**.00**	**.11**	**13.34**	**.00**	**.11**	**13 28**	**00**	**.10**	**12 06**	**.00**	**10**	12 79	00
Difference × egregiousness	01	1 08	28	01	1 24	22	01	1 24	22	01	1 15	25	01	1 35	18
Self-enhancement	**.07**	**7.71**	**.00**	**.07**	**6.78**	**.00**	**.07**	**6 61**	**00**	**.06**	**6.26**	**.00**	**.07**	**7.19**	**.00**
Self-enhancement × egregiousness	**.02**	**1.98**	**.05**	**.03**	**2.18**	**.03**	**.02**	**1.97**	**.05**	**.03**	**2.12**	**.03**	**.03**	**2.34**	**.02**
Counterarguments	**–.09**	**–11.25**	**00**	—	—	—	—	—	—	—	—	—	—	—	—
Counterarguments × egregiousness	– 01	–1 07	28	—	—	—	—	—	—	—	—	—	—	—	—
Constrained consumption	**–.10**	**–4.37**	**00**	**–.12**	**–5.03**	**.00**	**–.13**	**–5.43**	**.00**	**–.10**	**–4.12**	**.00**	**–.10**	**–4.20**	**.00**
Constrained consumption × egregiousness	**–.07**	**–2.58**	**01**	**–.10**	**–3.22**	**.00**	**–.08**	**–2.82**	**.01**	**–.08**	**–2.65**	**.01**	**–.09**	**–3.02**	**.00**
Free ride	—	—	—	**–.03**	**–5.64**	**.00**	—	—	—	—	—	—	—	—	—
Free ride × egregiousness	—	—	—	– 00	– 17	87	—	—	—	—	—	—	—	—	—
Too small	—	—	—	—	—	—	**–.03**	**–5.81**	**.00**	—	—	—	—	—	—
Too small × egregiousness	—	—	—	—	—	—	**–.01**	**–2.12**	**.03**	—	—	—	—	—	—
Hurt jobs	—	—	—	—	—	—	—	—	—	**–.06**	**–9.27**	**.00**	—	—	—
Hurt jobs × egregiousness	—	—	—	—	—	—	—	—	—	**–.02**	**–2.16**	**.03**	—	—	—
Country products	—	—	—	—	—	—	—	—	—	—	—	—	**–.05**	**–8.74**	**.00**
Country × egregiousness	—	—	—	—	—	—	—	—	—	—	—	—	– 01	– 75	45
Sex	**.07**	**2.12**	**.04**	**.07**	**1.97**	**.05**	**.06**	**1.60**	**.11**	**.06**	**1.79**	**.07**	**.06**	**1.85**	**.07**
Phase	**.10**	**2.96**	**.00**	**.11**	**3.22**	**.00**	**.11**	**3.25**	**.00**	**.11**	**3.18**	**.00**	**.10**	**3.03**	**.00**
	Adjusted R^2 = 47			Adjusted R^2 = 42			Adjusted R^2 = 42			Adjusted R^2 = 46			Adjusted R^2 = 46		

Notes Numbers in boldface indicate variables that are significant at $p <$ 05

TABLE 5
Illustration of Magnitude of Effects: Predicted Number of Boycotters

		Egregiousness		
		Low	Medium	High
Make a difference	Low	12 (1%)	52 (5%)	75 (7%)
	Medium	110 (10%)	180 (16%)	261 (24%)
	High	254 (23%)	387 (35%)	504 (45%)
Self-enhancement	Low	52 (5%)	96 (9%)	124 (11%)
	Medium	110 (10%)	180 (16%)	261 (24%)
	High	190 (17%)	309 (28%)	409 (37%)
Counterarguments	Low	177 (16%)	281 (25%)	394 (36%)
	Medium	110 (10%)	180 (16%)	261 (24%)
	High	74 (7%)	122 (11%)	166 (15%)
Constrained consumption	Low	123 (11%)	230 (21%)	339 (31%)
	Medium	110 (10%)	180 (16%)	261 (24%)
	High	95 (9%)	154 (14%)	198 (18%)

Notes The numbers are based on the linear probability model In our sample, there were 180 actual boycotters out of 1108 observations (less than our total sample of 1216 because of missing data) For an explanation of how we calculated the predictions, see Note 14

Thus, from Models A–E in Table 4, we find support for H_1–H_{5b} (support for H_{2b} was directional but not significant, and support for H_{4b} was directional but not significant, though we found significant differences for the counterargument variables too small and hurts jobs) We find the strongest direct effects for make a difference and counterarguments The interactions were less powerful but were often significant, and all were in the predicted direction, the strongest moderators were constrained consumption and self-enhancement

Estimated participation On average, respondents believed that 27% of consumers were boycotting, which is a substantial overestimate of the actual number that reported participation (16%) Boycotters estimated that 40% were participating Nonboycotters also overestimated participation (at 23%) When we include estimated participation (see Table 6), the basic model (egregiousness and cost–benefit motivations) remains substantially unchanged, and the explanatory power increases only slightly Still, perception of others' boycott activity plays a noteworthy role in the model Estimated participation has a significant direct effect on boycotting The greater the number of people a consumer believed were participating, the more likely was the consumer to join in Estimated participation also interacts significantly with make a difference and counterarguments [17] All the signs of the coefficients are consistent with our previous conjectures about the effects of estimated participation

TABLE 6
Regression Model F Including Estimated Participation (Percentage of Others Boycotting)

	b	t	p
Egregiousness	**.106**	**4.52**	**.00**
Make a difference	**.089**	**10.62**	**.00**
Difference × egregiousness	009	85	40
Self-enhancement	**056**	**5 27**	**.00**
Self-enhancement × egregiousness	**022**	**1.71**	**.09**
Counterarguments	**–.090**	**–10.55**	**00**
Counterarguments × egregiousness	– 008	– 71	48
Constrained consumption	**–.120**	**–4 89**	**00**
Constrained consumption × egregiousness	**–.073**	**–2.36**	**.02**
Percentage others	**.004**	**4.14**	**.00**
Others × egregiousness	– 001	– 51	61
Others × make a difference	**.001**	**2 11**	**.04**
Others × self-enhancement	000	95	34
Others × counterarguments	**–.001**	**–2.39**	**02**
Others × constrained consumption	002	1 37	17
Sex	**064**	**1.77**	**.08**
Phase	**087**	**2.49**	**.01**
	Adjusted R^2 = 49		

Notes Numbers in boldface indicate variables that are significant at $p <$ 05 Mean estimate of the percentage of other people boycotting = 27% (standard deviation = 19 12)

Brand image Tracking data indicated that before public knowledge of the intended factory closings, Bremmer's image was extremely positive 96% had a "very good" or "good" opinion of the firm, and 2% had a "poor" opinion This positive rating had dropped to 68% by the start of our data collection, and the percentage of respondents with a negative opinion rose to 30% during the same period Thus, the controversy damaged an image that had previously been almost universally positive

Higher egregiousness was inversely related to brand image (β = – 33, $p <$ 001, we report standardized coefficients here for ease of comparison), in support of H_{6a} (see Figure 1) Egregiousness also predicted the boycott decision (β = 31, $p <$ 001) When both egregiousness and the boycott decision predict brand image, both are significant (β = – 24, $p <$ 001, and β = – 27, $p <$ 001, respectively), and the direct path from egregiousness to boycotting drops significantly (from –.33 to –.24, t = 2.19, $p < .05$).

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[17] When we include the argument variables separately in this model (as in Models B–E), the interactions between estimated participation and hurt jobs and between estimated participation and country are significant ($p <$ 05), and the interactions with the other two counterargument variables are in the expected direction (p = 24 for too small, and p = 18 for free-riding, which is consistent with the prediction that the incentive to free ride is stronger when more people participate)

Thus, we find support for the partial mediation of boycotting on the relationship between egregiousness and brand image (Baron and Kenny 1986). This finding suggests that boycotting itself (beyond the effects of perceived egregiousness) predicts brand image, in support of H_{6b}. The effect of boycotting on brand image remains significant even if all direct effects and interactions (from Model F) are included in the regression ($\beta = -.21$, $p < .001$).[18] From a different angle, among participants who were high in egregiousness (scores of three or greater on the four-point egregiousness scale), 72% of boycotters assigned a "poor" rating to Bremmer, whereas only 24.2% of nonboycotters gave this rating. These figures are much higher than the preboycott, full sample "poor" rating of 2%.

Other Results

Corporate messages and egregiousness. Respondents who had heard that Bremmer had offered alternative jobs to dismissed workers gave significantly lower egregiousness ratings than did respondents who had not heard this communication (m = 2.58 and 2.86, respectively, t[1203] = 5.04, $p < .001$). We found similar results for the message that Bremmer had tried to find other firms to employ the workers (m = 2.65 and 2.86, respectively, t[1204] = 4.29, $p < .001$). For respondents who had heard either message, a positive reaction to the message was inversely related to egregiousness (r = –.32, $p < .001$ and r = –.19, $p < .001$ for other jobs and other firms, respectively). However, responsiveness to corporate messages did not moderate the relationship between egregiousness and the boycott decision (interaction terms were not significant). Thus, corporate messages were effective in reducing egregiousness, but they did not disrupt the relationship between egregiousness and boycotting.

Demographics. Age was not a predictor of egregiousness or boycotting (r = –.04, not significant, and r = –.06, not significant, respectively). Respondents' sex predicted boycotting ($\chi^2 = 11.01$, $p < .01$); 19% of women boycotted compared with 13% of men. Furthermore, in the models presented in Tables 4 and 6, sex was significant. An examination of mean differences between men and women shows that women tend to be stronger on the motivations for boycotting and that there are significant differences in perceived egregiousness, make a difference, self-enhancement, and free-riding.

Discussion

Our study investigated a high-profile social-issue boycott. The boycott target has been widely condemned and has received extensive negative coverage in national print and broadcast media. Respondents were well aware of the issue leading to the boycott and overwhelmingly disapproved of the company's actions.[19] It was a situation that marketers prefer to avoid.

The perceived egregiousness of the firm's actions was a powerful predictor of boycott participation. The more egregious a consumer perceived the firm's behavior, the more likely the consumer was to boycott. However, egregiousness notwithstanding, most of the sample was *not* participating in the boycott. To help understand this, we drew on theories of prosocial behavior and the boycott literature to test a cost–benefit approach to boycott participation. We found that in addition to perceived egregiousness, consumers need to believe that boycotting is an appropriate and effective response (make a difference). Consumers also need to realize intrinsic rewards of boycott participation, potentially boosting or maintaining self-esteem by, for example, avoiding guilt and responding to social pressure (self-enhancement). This has a direct effect and moderates the effect of egregiousness on boycott participation. Furthermore, consumers also take into account the cost of a preferred product forgone (constrained consumption) and the costs of boycott-induced harms and doubts about whether participation is necessary (counterarguments). Many of these costs also moderate the effect of egregiousness on boycotting.

Consumers' estimates of support for a boycott also appear to influence participation directly, but this effect is moderated by counterarguments (people who counterargued were less likely to boycott when they believed that many others were boycotting) and by make a difference (people who were high in make a difference were more likely to boycott if they believed that many others were boycotting). The (not significant) directional finding for the interaction between estimated participation and constrained consumption supports Sen, Gurhan-Canli, and Morwitz's (2001) contention that when boycotting costs are high, people are particularly averse to being exploited by others' free-riding and are less likely to boycott. Furthermore, there may be individual differences with regard to boycott propensity, including that women are more likely to boycott than men. We also found that the act of boycotting harmed brand image beyond the effects of perceived egregiousness. Finally, although firm communications did not lessen the effect of egregiousness on boycotting, they appeared to lower levels of perceived egregiousness.

Managerial Implications

At first glance, our findings might appear to be encouraging for managers of targeted firms and disappointing for managers of NGOs that call for boycotts, given the boycott's high profile and the relatively low level of participation (16%). Keeping consumers from becoming boycotters is a key consideration for firms. Asking why consumers do not boycott is likewise critical for NGOs. Our findings suggest that even high levels of perceived egregiousness are insufficient to motivate boycott participation because cost–benefit motivations for participation play a key role.

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[18] An alternative model, in which brand image mediated the relationship between egregiousness and the boycott decision, was not supported.

[19] As further (indirect) evidence of perceived egregiousness, a national poll at the time of the boycott found that nearly nine of ten people judged it "unacceptable" for profitable companies to make employees redundant.

On closer examination, however, the boycott appears to have inflicted damage on Bremmer First, the boycott represented substantial lost sales in a highly competitive market (retail audit evidence of sales declines during the boycott corresponded to the level of participation reported in the study), Table 5 reveals that the loss could have been much worse Second, the boycott provided shoppers with a reason to try competitors' products Third, participants' attitudes were probably hardened against Bremmer through boycott participation Perhaps the most consequential finding for the firm is that brand image was harmed among both nonboycotters and boycotters This indirect effect may be far more significant in the long run than the direct loss of sales Managers of targeted firms must pay attention to nonboycotters as well as boycotters

More fundamentally, there is empirical support for the argument that boycotts can serve as a mechanism by which consumers can hold firms accountable for perceived CSR failings As well as being of practical significance to NGOs, this finding is of theoretical significance because it demonstrates enhanced consumer sovereignty (Smith 1990) Changes in company policy following boycotts of Shell and Nike, for example, are consistent with the idea of firms being held accountable in consumer markets and with this pressure translating into a "business case" for CSR (Smith 2003)

We propose a variation of the well-known awareness, trial, repurchase model of buyer behavior as a framework for boycott management Our awareness, egregiousness, boycott (AEB) model incorporates our findings on motivations for boycott participation and offers propositions for managers of both firms and NGOs Although we offer propositions to each party separately, each should be aware of the other party's propositions as a source of insight on opposing strategies and tactics Figure 2 depicts the model with data from the Bremmer boycott

The first step for the firm is the measurement of awareness For many boycotts, awareness is extremely low (Friedman 1999) Firms might nonetheless choose to treat a boycott call as a warning signal and investigate the allegedly egregious conduct Even a small number of protestors might have a valid criticism of the firm's behavior However, if awareness levels are high or growing, the next step is research to measure the level of perceived egregiousness and to gain a better understanding of why consumers find the firm's actions objectionable The firm can then formulate its boycott strategy and decide whether to change current practice, engage in mitigating actions, or communicate the reasons behind its actions (Smith 1990) Bremmer was unwilling to reconsider its factory-closure decision, but many firms are not so committed to a policy that prompts a boycott, and this is likely to have a significant impact on the firm's strategy and on boycott success (Garrett 1987) The increasing power of NGOs emphasizes the need for a firm to be particularly careful in assessing its policy commitment (Spar and La Mure 2003)

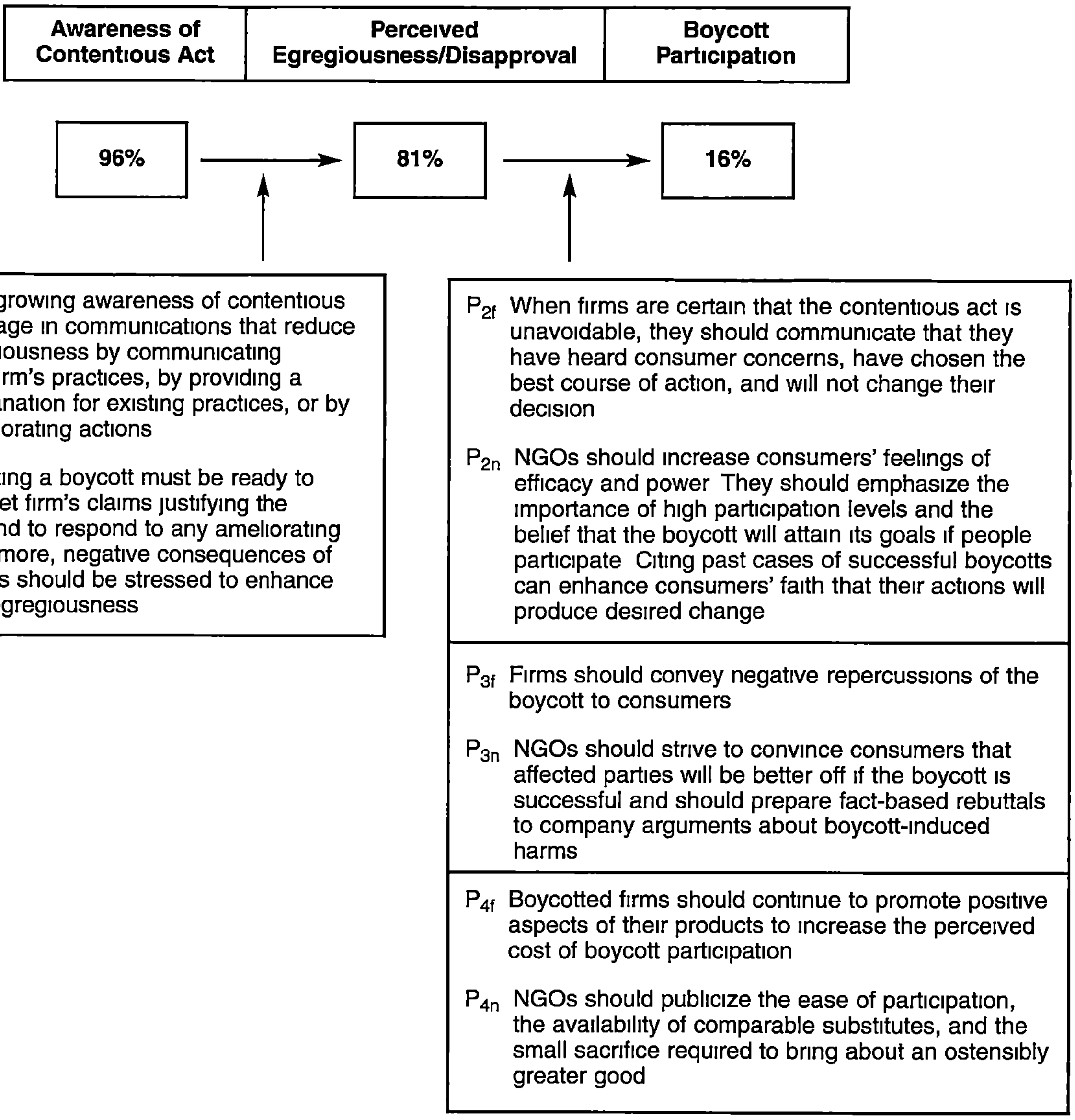
Our findings illuminate the firm's key strategy decision of whether to fight or to acquiesce to NGO demands For example, in the Nestlé boycott, the company initially chose to ignore its critics, then fought them, and eventually acceded to their demands in an embarrassing climbdown (Smith 1990) Our results suggest that this is a highly inefficient strategy because Nestlé's initial nonresponse enraged activists and probably harmed brand image for the long run, whereas its eventual backdown probably increased perceived efficacy However, the company's establishing the Nestlé Infant Formula Audit Commission, an impartial outside group of social auditors, was widely credited with lessening support for the boycott, in part by reducing widespread perceptions of egregious conduct by Nestlé (Pagan 1986) Nonetheless, a firm's early and easy capitulation to NGO demands might signal weakness and enhance boycotters' sense that they can influence the firm and make a difference This could prompt further demands as the NGO ups the ante For example, after being threatened with a global boycott, Starbucks quickly agreed to meet the demand by Global Exchange that 1% of its coffee sales be certified as "fair trade", Global Exchange is now seeking to increase that percentage to 5% (Sullivan 2003)

Good customer relationships facilitate communication, and prior investments in branding and a socially responsible image can serve as a form of "insurance" to counteract information about egregious conduct (Dawar and Pillutla 2000, Klein and Dawar 2003) Communications should be directed at both nonboycotters and boycotters to reduce perceptions of egregiousness and thereby to protect brand image and to lower boycott participation For the NGO's part, it must be ready to respond This leads to our first propositions for firms (P_{1f}) and NGOs (P_{1n}), which are shown in Figure 2

The next step is to examine whether perceived egregiousness translates into boycott participation Here, our findings on costs and benefits come into play If consumers believe that the boycott will influence the firm, they are more likely to participate (make a difference) As P_{2f} suggests (Figure 2), firms can communicate that the boycott is unlikely to be successful This message must be communicated carefully, for showing that consumer objections have been heard is a key component of P_{2f} Corresponding strategies for NGOs are suggested in P_{2n} Consistent with building a sense of consumer efficacy and power, the Ethical Consumer Research Association lists recent boycott successes on its Web site Another effective strategy for NGOs is probably to start small and build on successes more easily achieved University apparel was an initial focus of campaigns in the United States against sweatshop labor, and several university administrations quickly acceded to student demands in the face of campus demonstrations (Brixey 2000)

Our findings suggest that people boycott to feel good about themselves (self-enhancement), but they are less likely to participate if they believe that the boycott has negative outcomes (counterarguments) Although managers should refrain from directly challenging the self-enhancement value of social action, their communication of harmful effects of boycotting may lessen the feel-good aspects of participation and reduce the link between perceived egregiousness and boycotting For example, a firm boycotted because of its low wages (by Western standards) to overseas workers may counter that a "successful" boycott would result in the closure of factories, leaving former employees in poverty Thus, we propose P_{3f} (Figure 2)

FIGURE 2
AEB Model


Awareness of Contentious Act
Perceived Egregiousness/Disapproval
Boycott Participation
96%
81%
16%

P_{1f} Firms with high/growing awareness of contentious acts should engage in communications that reduce perceived egregiousness by communicating changes in the firm's practices, by providing a convincing explanation for existing practices, or by publicizing ameliorating actions

P_{1n} An NGO promoting a boycott must be ready to counter the target firm's claims justifying the egregious act and to respond to any ameliorating actions Furthermore, negative consequences of the firm's actions should be stressed to enhance perceptions of egregiousness

P_{2f} When firms are certain that the contentious act is unavoidable, they should communicate that they have heard consumer concerns, have chosen the best course of action, and will not change their decision

P_{2n} NGOs should increase consumers' feelings of efficacy and power They should emphasize the importance of high participation levels and the belief that the boycott will attain its goals if people participate Citing past cases of successful boycotts can enhance consumers' faith that their actions will produce desired change

P_{3f} Firms should convey negative repercussions of the boycott to consumers

P_{3n} NGOs should strive to convince consumers that affected parties will be better off if the boycott is successful and should prepare fact-based rebuttals to company arguments about boycott-induced harms

P_{4f} Boycotted firms should continue to promote positive aspects of their products to increase the perceived cost of boycott participation

P_{4n} NGOs should publicize the ease of participation, the availability of comparable substitutes, and the small sacrifice required to bring about an ostensibly greater good

Notes Percentage values refer to the Bremmer boycott

As for NGOs, they should prepare rebuttals to company arguments about boycott-induced harms (P_{3n} in Figure 2) In response to the claim that blacks were hurt most by boycotts of firms associated with apartheid South Africa, NGOs responded that the goal of freedom from apartheid was more important (Smith 1990) Furthermore, a key insight for an NGO that calls for a boycott is that its motivations need not be identical to those of individual consumers An NGO with a strongly instrumental goal may best achieve its aims by encouraging self-enhancement through boycotting Thus, with subtlety, the NGO could imply that failure to participate would lead to feelings of guilt Equally, the use of celebrity endorsements by NGOs can be expected to help boost consumers' self-esteem through boycott participation For example, Bianca Jagger has lent her support to the Exxon boycott called over its environmental policies (Whitney 2001) More generally, NGOs should seek media attention to the boycott because this can be expected to increase both awareness and social pressure for participation

Boycotting entails a sacrifice by the consumer (constrained consumption) For NGOs, the task is to justify and minimize this sacrifice Firms often cut advertising during a boycott (as Bremmer did) because they do not wish to draw attention to the brand or because they believe that the advertising spend would be wasted The opposite strategy may be warranted Well-crafted advertising could strengthen brand commitment and reinforce positive associations to the brand in memory, thus increasing the cost of boycotting and helping counteract the effects of negative information (Ahluwalia, Burnkrant, and Unnava 2000, Tybout, Calder, and Sternthal 1981) Furthermore, advertising that taps into values such as health and safety might be beneficial, because forgoing a product with these attributes may reduce the possible self-enhancement of boycott participation Thus, we propose P_{4f} and P_{4n} (Figure 2)

Study Limitations and Directions for Further Research

Our research faces some limitations that stem from the exigencies of researching an actual boycott in progress Although our measures were informed by our prior study, we had neither the luxury of piloting some measures nor absolute discretion over survey content, administration, and the precise wording of questions However, we believe that these limitations do not materially influence our results and, on balance, are minor compared with the opportunity to study a real, ongoing boycott

There are issues of generalizability Our study is of a particular boycott on a specific issue The egregious act in this case (i e , factory closings) may be associated with greater self-interest than is the case for boycotts prompted by, for example, animal rights The boycott was particularly high profile (which is all the more useful to the extent that we were interested in explaining why people do *not* boycott), but it is possible, or even probable, that our results are not relevant to the many calls to boycott that consumers largely ignore and that management can also safely ignore In addition, although our data are from a nationally representative sample, they are from a specific country We doubt that the trigger for this boycott would have had the same resonance in the United States, for example We have sound theoretical reasons to believe that the motivations we uncovered are quite general, but this remains to be confirmed by research on other boycotts in different countries, prompted by different issues

It is unlikely that we have uncovered all potential motivations for boycott participation, and further research could investigate other costs and rewards of boycotting that we may have failed to capture in our model We did not investigate the boycotter's decision-making process, and particularly whether egregiousness leads to a firm's product being excluded from the consumer's consideration set or whether the firm's egregious conduct is traded off against product attributes The answer may lie in the level of perceived egregiousness Perhaps at moderate levels of egregiousness, the consumer trades off the firm's conduct, but at high levels, the consumer excludes the product from consideration

The study also has implications for research on corporate associations and CSR-related issues Our findings with respect to boycotts may well extend to the broader category of ethical influences on consumer behavior, which implies scope for exploring the role of a similar set of moderators in the models of, for example, Brown and Dacin (1997) and Sen and Bhattacharya (2001) Our work might also contribute to research on complaining behavior, thus suggesting motivations that may underlie complaining (e g , self-enhancement) Furthermore, our framework could be used to study other collective action situations, such as voting

Finally, in light of our claims on self-enhancement, we believe that it is appropriate to identify boycotting as part of a broader form of "symbolic nonconsumption" Writing on possessions and symbolic consumption, Belk (1988, p 139) states, "That we are what we have is perhaps the most basic and powerful fact of consumer behavior" What does it mean when consumers choose *not* to consume a product because of a social issue associated with the producer? Perhaps we boycott because we are also what we do not have

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Understanding Adolescent Intentions to Smoke: An Examination of Relationships Among Social Influence, Prior Trial Behavior, and Antitobacco Campaign Advertising

Telephone interviews were conducted with more than 900 adolescents aged 12 to 18 as part of a multimillion dollar, statewide, antitobacco advertising campaign The interviews addressed two primary questions (1) Do counter-advertising campaign attitudes directly affect antismoking beliefs and intent in a manner similar to those of conventional advertisements? and (2) Can advertising campaign attitudes have a stronger effect on beliefs and intent for adolescents with prior smoking behavior and for adolescents exposed to social influence (i e , friends, siblings, or adult smoker in the home)? The authors' findings show that advertising campaign attitudes, prior trial behavior, and social influence all directly affect antismoking beliefs and that advertising campaign attitudes interact with prior trial behavior to strengthen antismoking beliefs The results indicate that attitudes related to the campaign, prior trial behavior, and social influence directly influence intent, and advertising campaign attitudes interact with social influence and prior trial behavior to attenuate adolescent intent to smoke In addition, the effect of advertising campaign attitudes in attenuating social influence and prior trial behavior effects on adolescent intent to smoke persists even when the authors account for strongly held beliefs about smoking The authors discuss implications for countermarketing communications and the design and understanding of future antismoking campaigns

An understanding of why adolescents decide to smoke and the development of successful countermeasures are important issues in the public health and social marketing fields today The statistics on smoking morbidity are compelling For example, tobacco use is the leading preventable cause of death in the United States, contributing to more than 440,000 deaths each year and resulting in $75 billion in direct medical costs (Centers for Disease Control and Prevention [CDC] 2002) Furthermore, the U S Food and Drug Administration has characterized smoking as a pediatric disease, 80% of current adult smokers began before age 18, and more than 5000 youths try their first cigarette each day (CDC 2002) Adolescents are estimated to have three times the sensitivity to cigarette advertising than adults (Pollay et al 1996), and recent documents have shown youths to be an important target market for the tobacco industry (Cohen 2000, Pollay and Lavack 1993)

What, then, leads adolescents to smoke? Demographic analyses suggest that there is a greater tendency for older, Caucasian, male youths who are not in school to smoke than there is for other adolescent groups (Jamieson and Romer 2001) Other potential predictors of adolescent smoking include social influence (e g , friends or family effects), prior smoking behavior, and imagery portrayed in tobacco advertising (Aloise-Young, Graham, and Hansen 1994, Pechmann and Knight 2002) For example, tobacco advertising has been shown to have both direct and indirect effects on adolescent smoking behavior Cohen (2000) suggests that tobacco advertising conveys symbolic and/or physiological benefits to adolescents that directly affect their decision to smoke Alternatively, Romer and Jamieson (2001) present models that show that cigarette advertising encourages adolescents' attraction to peers who smoke and that peers' approval of smoking helps initiate smoking trial in peer groups (an indirect effect) Romer and Jamieson also find that cigarette advertising directly influences peer approval separate from its impact on imagery and feelings

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about smoking. In summary, evidence suggests that social influence and tobacco advertising can affect the decision to begin smoking.

In principle, Romer and Jamieson (2001) argue that antitobacco advertising may operate in a similar and opposite manner of tobacco advertising. That is, antitobacco advertisements are likely to counteract the approval and attraction process through the use of negative images of smokers and favorable images of nonsmokers. Thus, the models of Romer and Jamieson (2001) may be applicable to the study of social influence and antismoking ad campaigns. Given that state antitobacco programs have shown that counteradvertising can reduce the positive perceptions of smoking in peer networks and overall views of cigarette advertising (cf. Siegel and Biener 2000), antismoking advertisements may negatively affect intent to smoke. Still, how antismoking ad campaigns *interact* with social influence (and with other variables) has largely been unexplained, and the potential mediating role that beliefs about smoking may have in affecting intent to smoke has not been explored. Furthermore, it has been suggested that knowledge of teen smoking can be advanced by field studies that examine the combined effects of social influence, beliefs, and counteradvertising campaigns (Romer and Jamieson 2001). As such, our study addresses two primary questions: (1) Do counteradvertising campaign attitudes directly affect antismoking beliefs and intent in a manner similar to that of conventional advertisements? and (2) Can ad campaign attitudes have a stronger effect on beliefs and intent for adolescents with prior smoking behavior and for adolescents exposed to social influence (i.e., friends, siblings, or adult smoker in the home)? We use data from a major state antitobacco campaign to address these questions.

Overview and Hypotheses

Campaign Overview

Our study examines predicted relationships that are tested in conjunction with Wisconsin's first major antitobacco advertising campaign, for which some $6.5 million was allocated. Specific antismoking advertisements used in the campaign targeted youths of middle school and high school age, for whom smoking incidence rates were higher than national averages. The specific advertisements used had been successfully tested and run in other states, and the advertisements were placed in youth television and radio spots in seven major markets in the state running the antismoking campaign. A primary theme of the campaign was that of industry deception and anti-imagery, and other message themes focused on addiction and harmful effects of secondhand smoke. The campaign ran for approximately six months.

Model Overview

Figure 1 presents direct, interaction, and mediating relationships for two key dependent variables: antismoking beliefs about the campaign (beliefs) and intent to smoke. The interaction and mediating effects are of particular interest in contributing to the literature on countermarketing campaign advertising. We predict that prior smoking trial (prior trial behavior) as well as having siblings, an adult in the home, or friends who smoke (social influence) will negatively affect antismoking beliefs about the campaign (beliefs). A favorable attitude toward specific antitobacco campaign advertisements (ad campaign attitude) will have a positive effect on beliefs, and the negative effects of prior trial behavior and social influence on beliefs will be attenuated when they interact with ad campaign attitude. For intent to smoke, we predict that beliefs will have a negative effect, prior trial behavior and social influence positive effects, and ad campaign attitude a negative effect. In addition, we predict interactions such that the effects of prior trial behavior and social influence on intent to smoke will be attenuated by ad campaign attitude. Furthermore, we predict that beliefs will partially mediate the effects of social influence, ad campaign attitude, and the ad campaign attitude × social influence and ad campaign attitude × prior trial behavior interactions on intent to smoke. We subsequently discuss the rationale for these relationships.

Predicted Effects on Beliefs

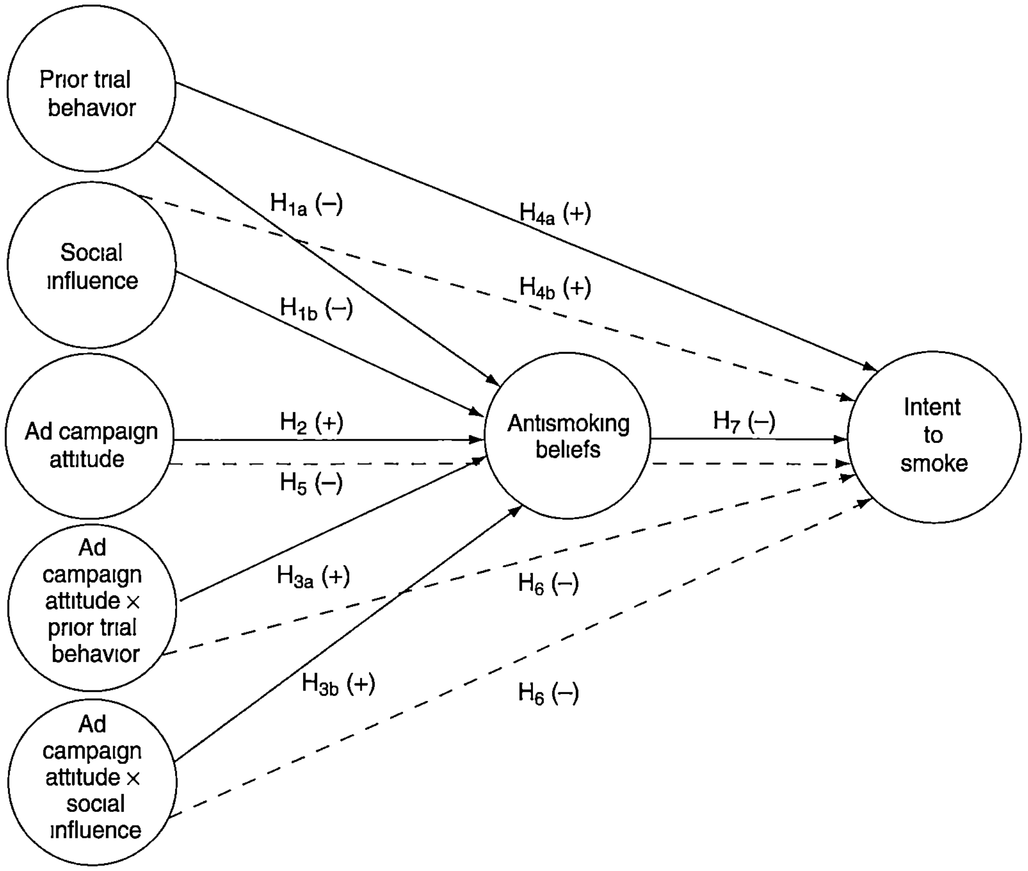
Direct effects of prior trial behavior and social influence. Antismoking beliefs related to the campaign (beliefs) include that tobacco companies use deceptive practices in advertising, that smoking is addictive, and that secondhand smoke is harmful. We expect that prior trial behavior and social influence directly affect these beliefs for the following reasons. It has been shown that consumers ignore or counterargue messages that contradict their beliefs and behaviors (Petty and Cacioppo 1981), and research indicates that smokers tend to discount the negative consequences of smoking (Romer and Jamieson 2001). Such a process can occur even though the basis for such beliefs may be more emotional than has previously been believed (Slovic 2001). Thus, we expect that prior trial behavior negatively affects antismoking beliefs associated with the campaign.

We operationalize social influence as a behavioral construct that reflects the influence of family and peer smoking behavior on adolescents. The socialization process suggests that family and friends strongly influence the beliefs of adolescents (John 1999), and this effect is evident in the smoking literature. For example, Romer and Jamieson (2001) show that having friends or siblings who smoke weakens adolescents' beliefs about the risks of smoking, and Simons-Morten and colleagues (2001) suggest that parental guidance on not smoking lessens the positive beliefs that adolescents might have about smoking. Thus, we expect that social influence negatively affects antismoking beliefs (beliefs).

> H_1: Antismoking beliefs (beliefs) are negatively affected by (a) trying cigarettes in the past (prior trial behavior) and (b) social influence (i.e., a sibling or friends who smoke, an adult smoker in the household).

Direct effects of ad campaign attitude. We expect that ad campaign attitude affects antismoking beliefs (beliefs) for several reasons. Hierarchy-of-effects models suggest a positive and direct relationship between attitude toward the ad and beliefs about the advertisement's message. For

Figure 1
Factors Predicted to Affect Adolescent Antismoking Beliefs and Intent



Notes: Lines with dashes indicate relationships hypothesized to be partially mediated by antismoking beliefs (H_7). The partially mediated effects include social influence → intent to smoke, ad campaign attitude → intent to smoke, ad campaign attitude × prior trial behavior → intent to smoke, and ad campaign attitude × social influence → intent to smoke. Ad campaign attitude × prior trial behavior and ad campaign attitude × social influence are hypothesized interactions.

example, Brown and Stayman (1992) report a link between attitude and consumer cognitions, and studies that involve dual-mode processes support a positive effect of attitude toward the ad on brand-related beliefs (Lutz 1985). Evidence from the diffusion model of smoking also suggests that with the creation of favorable imagery and affect, a subsequent decline in the negative risk beliefs about smoking follows (Romer and Jamieson 2001). If the diffusion model principle that antismoking advertisements can have the opposite effects holds, ad campaign attitude should positively and directly influence antismoking beliefs. Thus, ad campaign attitude should explain incremental variance in beliefs related to the campaign that prior trial behavior and social influence do not explain.

H_2: Favorable attitudes toward specific campaign advertisements (ad campaign attitude) positively affect antismoking beliefs (beliefs).

Interaction effects with ad campaign attitude. Although H_1 and H_2 are of interest to the smoking and advertising literature, they are direct-effects hypotheses. However, an understanding of the *interactions* among ad campaign attitude, prior trial behavior, and social influence may enhance knowledge of how these factors act in tandem to affect antismoking beliefs and intent to smoke. Although such interactions are consistent with conceptualizations that combine prior trial behavior with effects related to advertising (Vakratsas and Ambler 1999), we are not aware of any work that has addressed counteradvertising's interactions with prior trial behavior and social influence in their effects on adolescent antismoking beliefs.

We propose that ad campaign attitude serves to weaken the negative effects of prior trial behavior and social influence on antismoking beliefs. Antismoking beliefs are typical among youths (Barton et al. 1982; Chassin et al. 1981), but as we hypothesize, these beliefs can be weakened through direct experience with smoking or contact with peers who smoke (Pechmann and Knight 2002; Pechmann et al. 2003). Given such weaker antismoking beliefs, favorable campaign attitudes should have significant opportunity to affect beliefs. We expect this effect because there is greater room for change when prior antismoking beliefs are less robust. However, for adolescents with little smoking exposure, ad campaign attitude will have less opportunity to affect antismoking beliefs because they are already quite strong (for these adolescents, ad campaign attitude may tend to reinforce their existing antismoking beliefs). This rationale suggests that interactions of prior trial behavior and social influence with ad campaign attitude are positive and significant predictors of antismoking beliefs (beliefs). Specifically, we expect that ad campaign attitude has a stronger (and more positive) influence on antismoking beliefs for adolescents who have tried smoking or who have been exposed to social influence through friends or family.

> H_3 The negative effects of (a) prior trial behavior and (b) social influence on antismoking beliefs (beliefs) are attenuated by favorable attitudes toward campaign advertisements (ad campaign attitude).

Predicted Effects on Intent to Smoke

Direct effects of prior trial behavior and social influence. As Bem (1967) suggests, attitudes and intent are often inferred from prior behavior. As applied to adolescent smoking, prior trial behavior (i.e., smoking trial in which at least one cigarette was partially smoked) should affect future behavior (and intent). Research suggests that when intent is measured for a specific context that involves observable and easily initiated behavior, it is likely that intent predicts onset (Sheppard, Hartwick, and Warshaw 1988). Research also indicates that prior smoking behavior is a strong predictor of future smoking among adolescents (Stacy, Bentler, and Flay 1994). Similarly, the advertising literature shows that prior product usage dominates the effects of advertising influences on intent and behavior (Vakratsas and Ambler 1999). Thus, we expect that prior trial behavior positively affects intent to smoke.

Prior research also shows a link between social influence and intent to smoke. For example, teens whose parents smoke are more likely to smoke because cigarettes are more readily available at home, and through the socialization process, teens model adult behavior (Smith and Stutts 1999). Studies also show pronounced linkages between smoking or intent to smoke and having friends or siblings who smoke (Kaufman et al. 2002, Romer and Jamieson 2001). As such, we expect that social influence positively affects intent to smoke.

> H_4 Intent to smoke is positively affected by (a) trying cigarettes in the past (prior trial behavior) and (b) social influence (i.e., a sibling or friends who smoke, an adult smoker in the household).

Direct effects of ad campaign attitude on intent to smoke. In addition to the effects of prior trial behavior and social influence on intent to smoke, we anticipate that ad campaign attitude negatively affects intent to smoke. In the work of Armstrong and colleagues (1990), the perceived influence of cigarette advertisements outweighs parental, sibling, and peer smoking as a predictor of smoking behavior, and Smith and Stutts (1999) find that antismoking advertisements have a significant, negative effect on intent to smoke among adolescents. Such findings are consistent with the advertising literature that indicates that advertisements work on both cognitive and affective levels (Vakratsas and Ambler 1999) and that both cognitive (beliefs) and affective (attitude toward the ad) responses can have separate effects on intent (Burke and Edell 1989). Thus, if the antitobacco campaign is to be viewed as effective, ad campaign attitude should explain variance in intent to smoke in addition to that explained by prior trial behavior and social influence.

> H_5 Favorable attitudes toward specific campaign advertisements (ad campaign attitude) negatively affect intent to smoke.

Interaction effects with ad campaign attitude. We predict that ad campaign attitude will interact with prior trial behavior and social influence to weaken their relationships with intent to smoke. We offer two reasons for this prediction. First, Vakratsas and Ambler (1999) stress that the interaction of affect and personal experience is needed to appreciate the processing and effectiveness of advertising fully. Smith and Swinyard (1982) also note that under normal ad-processing conditions, advertising may not result in higher levels of affective impact until a person considers his or her own trial and experience. In the context of smoking, passive learning of smoking imagery over time may reinforce perceptions of others' decision to smoke within peer groups or a person's own smoking trial behavior. As we previously indicated, Romer and Jamieson (2001, p. 132) predict that antitobacco advertising works by counteracting the diffusion of favorable images by disseminating either unfavorable images of smokers (or industry practices) or favorable images of nonsmokers.

Second, adolescents with prior usage of and exposure to social influence are likely to express greater intent to smoke. Intent for such adolescents also differs from that of adolescents who have antismoking beliefs and express little intent to smoke (Pechmann and Knight 2002). Affect (attitudes toward campaign advertisements) related to counteradvertising messages tends to cue and reinforce negative smoking perceptions among adolescents with prior smoking behavior or social influence. In turn, this should reduce the positive effects of the social and behavioral influences on intent to smoke. We expect relatively weaker effects of such ad-related outcomes for adolescents who have little direct exposure to smoking, a segment for which intent to smoke is already low and thus is more difficult to influence through antismoking campaigns (Pechmann et al. 2003). (In addition, it is likely that the campaign will reinforce nonsmoking adolescents' resolve not to smoke.) Overall, this rationale suggests that ad campaign attitude should attenuate the effects of prior trial behavior and social influence on intent. This suggests that the ad campaign attitude × prior trial behavior and ad campaign attitude × social influence interaction terms are negative and significant predictors of intent to smoke.

> H_6 The positive effects of (a) prior trial behavior and (b) social influence on intent to smoke are attenuated by favorable attitudes toward campaign advertisements (ad campaign attitude).

Direct and mediating effects of beliefs. Empirical research indicates that beliefs about the consequences of a behavior are related to the intent to perform that behavior (Ajzen and Fishbein 1980) and that negative beliefs about the consequences of smoking are predictors of intent (Rindfleisch and Crockett 1999) It has been shown that when intent is specific to a behavior in terms of target, action, context, and time, the ability of intent to predict behavior is enhanced (Ajzen and Fishbein 1980, Fishbein and Ajzen 1975) Thus, we predict that antismoking beliefs related to the campaign will negatively affect intent to smoke

In Figure 1, antismoking beliefs (beliefs) also are positioned as a partial mediator of the effects that social influence, ad campaign attitude, and their relevant interactions have on intent to smoke As we noted previously, adolescents are likely to have strongly held beliefs about smoking that serve as a primary predictor of intent (Slovic, Fischhoff, and Lichtenstein 1980) Thus, given this strong effect on intent to smoke, we expect that inclusion of antismoking beliefs in the model reduces the effects of social influence, ad campaign attitude, and the ad campaign attitude × prior trial behavior and ad campaign attitude × social influence interactions on intent to smoke However, given the important role of affect in the evaluation of adolescents' smoking (Slovic 2001), the role of affect in judgment formation (Schwarz 1990), and the enduring impact of social influence on adolescents (John 1999), we do not expect that beliefs fully account for the effect of these independent variables on intent to smoke Thus, our predictions for the direct and partial mediation effects of beliefs are as follows [1]

H_7 Antismoking beliefs (beliefs) (a) negatively affect intent to smoke and (b) partially mediate the effects of social influence, ad campaign attitude, and the ad campaign attitude × prior trial behavior and ad campaign attitude × social influence interactions on intent to smoke

Methodology

The Wisconsin Antitobacco Media Campaign

As a result of the 1998 Master Settlement Agreement of the tobacco industry with the states, the Wisconsin Tobacco Control Board (WTCB, 2002) was created in 1999 An important objective of the board was to target antismoking programs and messages toward youths of middle and high school age According to the CDC, 32 9% of high school students in Wisconsin were smokers, a rate higher than the national average (Campaign for Tobacco-Free Kids 2002) More than $6 million ($6 5 million total, or $1 21 per capita) was allocated for the state's first major antitobacco advertising campaign (WTCB 2000) Because of the CDC's (1999) suggested minimum per capita allocations of $1 00 and ideal per capita allocations of $3 00 (Pechmann and Reibling 2000), the Wisconsin media campaign for 2001 provided an appropriate level of funding to help achieve exposure A main objective of the youth campaign was to convey a message of industry deception and anti-imagery This objective is consistent with recent successful programs that aimed to reduce and prevent adolescent smoking (cf Bauer et al 2000, Pechmann and Knight 2002, Perrachio and Luna 1998, Romer and Jamieson 2001) and with theory on attempts to persuade (Friestad and Wright 1994) Other important message themes focused on addiction and the harmful nature of secondhand smoke

Four specific advertisements ("Janet," "Patrick," Mohammed," and "FACT") were placed in youth television and radio spots in seven major Wisconsin markets from July 2001 to December 2001 The advertisements had been successfully tested and run in other states (e g , Massachusetts) and were recommended as part of CDC's best-practices list "Janet" features a former cigarette model with a coarse voice talking about how she used to try to convince people to smoke and now tells people to stop smoking "Patrick" shows a man talking about being part of a family of cigarette manufacturers and wanting people to know that they should not smoke "Mohammed" is about a young African American man reading about ways the tobacco companies have tried to target kids to start smoking Finally, in "FACT" (i e , "Fighting Against Corporate Tobacco"), a cigarette company executive is dreaming about kids tracking him down and yelling at him about lies he has told about smoking [2]

Interviewing Procedure and Sample

Telephone interviews were conducted with adolescents ranging in age from 12 to 18 years The sample was based on a list purchased from a major list vendor, and telephone numbers of potential respondents were randomly selected from the list Up to eight callbacks were made, for a response rate of 31% for adolescents who were known to be eligible for inclusion in the sample The survey took between 10 and 15 minutes to complete The introduction noted that the firm conducting the telephone interviews was doing "a survey of Wisconsin youth about their attitudes and opinions toward tobacco and other health issues" Parental permission to participate in the survey was obtained at the time of the interview for all respondents, and they were assured that their responses would remain confidential The average age of respondents was 14 7 years, 97% were in grades 7 to 12, 47% of the respondents were female, and 16% were African American As such, the sample was quite similar to that of Wisconsin census figures All data were collected in the latter portion of 2001, approximately six months after the antismoking campaign first began airing Across all analyses, the sample sizes used ranged from n = 924 to n = 943

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[1] Because prior behavior has been shown to be the strongest predictor of future smoking behavior (Stacy, Bentler, and Flay 1994), we do not hypothesize that the antismoking beliefs construct mediates the effect of prior behavior on intent to smoke

[2] A media campaign aimed at young adults directly focused on the following message themes (1) secondhand smoke kills and (2) nicotine is addictive and tobacco is deadly These messages served as additional objectives for adolescents, there were spillover effects of the young adult campaign for the adolescents Given the results of the confirmatory factor analyses we describe subsequently, we decided that one beliefs construct related to the three message themes was relevant and appropriate for tests of hypotheses Because we assessed hypotheses using a field study, we acknowledge that the industry deception, addiction, and secondhand smoke beliefs may be potentially influenced by other sources of information at the time of the campaign

Measures

Measures were drawn from previous state surveys, including the University of Massachusetts Tobacco Study Youth Instrument, Florida's Anti-Tobacco Media Evaluation Survey, the California Adult Tobacco Survey, and the CDC's Youth Tobacco Survey and Youth Risk Behavior Survey All measures and procedures were pretested with 75 respondents before the survey was conducted

Independent and control variables We assessed prior trial behavior by asking respondents whether they had ever tried smoking cigarettes, even one or two puffs (no = 0, yes = 1) Three items measured social influence The first item asked respondents whether they had a sibling who smoked (no = 0, yes = 1), the second asked whether there was an adult smoker in the household (no = 0, yes = 1), and the third asked whether they had any friends (among their four closest friends) who smoked (no = 0, yes = 1) We summed the scores of these three items (sibling, adult smoker, and friends) to form one overall social influence composite that ranged from 0 to 3, such that a higher score suggested a stronger influence to smoke Respondents were screened such that they had to recall at least one campaign advertisement to ensure a basis for a campaign attitude For advertisements recalled, respondents rated their attitude toward the specific advertisements by indicating how much they liked each campaign advertisement on a ten-point scale (0 = "did not like the ad at all," 10 = "liked it very much") We summed these ratings and averaged them to form the ad campaign attitude measure We also included measures of age, gender (0 = female, 1 = male), and race (African American = 0, Caucasian = 1) as control variables in all analyses

Dependent variables We measured both dependent variables in the model with multiple items Antismoking beliefs related to the campaign pertained to three message themes (1) deceptiveness of the tobacco companies in their marketing practices, (2) the harmfulness of secondhand smoke, and (3) the addictiveness of smoking cigarettes Within each of these themes, we summed the scores on four items rated on four-point "strongly disagree/agree" scales and then averaged them to form an overall theme composite We summed and averaged the three composite scores to form indicators for one overall antismoking beliefs construct (beliefs) We measured intent to smoke with three items on four-point "definitely no/definitely yes" scales For the three indicators of the beliefs construct and the three items of the intent construct, standardized loadings from confirmatory factor models ranged from 65 to 95, and average variance extracted estimates for each of these multi-indicator/item measures exceeded 50 (Fornell and Larcker 1981) The Appendix shows all measures, and Table 1 reports all correlations and reliability estimates

Measurement checks We conducted analyses to determine whether antismoking beliefs should be represented as indicators of one overall construct First, in a confirmatory factor analysis, we specified the beliefs construct as a higher-order factor with the three themes (i e , deceptiveness of the tobacco companies in their marketing practices, harmfulness of secondhand smoke, and addictiveness of smoking cigarettes) as first-order factors We then specified the individual items used to assess each theme as manifest indicators of their respective first-order factors We used three indexes to examine the fit of this model (1) the comparative fit index (CFI), (2) the nonnormed fit index (NNFI), and (3) the root mean square error of approximation (RMSEA) Values in the mid- to high- 90 range indicate good fit for the CFI and NNFI, and values of 08 and less indicate good fit for the RMSEA (Hu and Bentler 1999) The higher-order model fit the data well (χ^2 = 73 97, degrees of freedom [d f] = 51, CFI = 99, NNFI = 98, RMSEA = 02) (Hu and Bentler 1999), and the standardized loadings of the first-order factors to the higher-order factor ranged from 74 to 95 ($p <$ 01), indicating a high degree of convergence among the first-order factors (Bagozzi and Heatherton 1994) Furthermore, the composite reliability estimates (estimates analogous to coefficient alpha) for the manifest indicators to their first-order factors were 78 for the deceptiveness of the tobacco companies in their marketing practices, 72 for the harmfulness of secondhand smoke, and 80 for the addictiveness of smoking cigarettes

Second, we conducted a series of t-tests between dependent correlations to determine whether the three beliefs

TABLE 1
Means, Standard Deviations, and Correlations Among Constructs

	Mean	Standard Deviation	1	2	3	4	5	6	7
1 Prior trial behavior	27	44	—						
2 Social influence	72	86	48	—					
3 Ad campaign attitude	7 31	2 11	– 19	– 20	*76*				
4 Ad campaign attitude × prior trial behavior	—	—	– 23	– 22	60	—			
5 Ad campaign attitude × social influence	—	—	– 14	– 20	27	56	—		
6 Beliefs	3 29	38	– 16	– 16	30	29	12	*79*	
7 Intent	1 34	62	54	44	– 29	– 40	– 30	– 30	*85*

Notes Italicized entries on the diagonal for Variables 3, 6, and 7 are coefficient alpha estimates of internal consistency All correlations are statistically significant ($p <$ 01) individually had different correlations with ad campaign attitude (an antecedent of beliefs) and intent to smoke (a consequence of beliefs) For example, to test whether the correlation between the belief of addictiveness of smoking cigarettes and intent to smoke differed from the correlation between the belief of harmfulness of secondhand smoke and intent to smoke, we used the procedure that Cohen and Cohen (1983, pp 56–57) recommend Across all correlational comparisons (six in total), we found no significant differences (t-values ranged from 92 to 1 23, $p >$ 10) Thus, the relationships between the beliefs about the deceptiveness of the tobacco companies, the harmfulness of secondhand smoke, and the addictiveness of smoking cigarettes and ad campaign attitude and intent to smoke did not differ In summary, we found evidence for a single antismoking beliefs construct

Analysis and Results

Consistent with the procedures of Holmbeck (1997), we used structural equation modeling (SEM) as our analytical approach This approach allows for an assessment of the incremental effects of the campaign-related constructs and their interactions after the effects of prior trial behavior and social influence have been taken into account This approach also incorporates the potentially biasing impact of measurement error on path estimates For beliefs and intent to smoke, we accounted for error in measurement by allowing the SEM package (LISREL 8) to estimate item/indicator loadings and measurement error terms freely For ad campaign attitude, we used its summed item score and set its measurement loading to the square root of its internal consistency estimate and its error term to 1 – coefficient alpha × construct variance to account for measurement error (Joreskog and Sorbom 1982) For all other single indicator constructs (i e , prior trial behavior, social influence, and the interaction terms), we set item loadings to 1 and error terms to 0 Consistent with prior smoking research, we accounted for any demographic effects by entering age, gender, and race as control variables for all models estimated

Effects on Antismoking Beliefs

H_1–H_2 Direct effects Panel A of Table 2 presents the results that pertain to beliefs H_1 predicts that prior trial behavior (H_{1a}) and social influence (H_{1b}) negatively affect antismoking beliefs related to the campaign (beliefs) Model 1 examines the two direct effect predictions, and the evidence shows that H_{1a} and H_{1b} are supported Across fit indexes (CFI, NNFI, and RMSEA), the model fits the data well, and both prior trial behavior and social influence negatively affect antismoking beliefs H_2 predicts that ad campaign attitude positively affects beliefs, and Model 2 tests this prediction by adding ad campaign attitude to the model Model 2, which includes the direct effects of all three predictors, also fits the data well, and the difference in fit between Model 1 and Model 2 is significant ($\chi^2_{\text{diff}} = 64\ 21$, d f $_{\text{diff}} = 1$, $p <$ 01) This difference between the models indicates that the inclusion of ad campaign attitude explains an additional 8% of the variance in beliefs that was not previously explained by prior trial behavior and social influence In total, prior trial behavior, social influence, and ad campaign attitude account for 13% of the variance in beliefs

H_3 Interaction effects of ad campaign attitude on beliefs We predict that ad campaign attitude attenuates the negative effects of prior trial behavior (H_{3a}) and social influence (H_{3b}) on antismoking beliefs Thus, we expect that the interactions of prior trial behavior and social influence with ad campaign attitude are positive and significant predictors of beliefs We mean-centered ad campaign attitude and social influence before creating the interaction terms (Aiken and West 1991), and then we added the interaction terms hierarchically to the predictors already in Model 2 to form Model 3 As is shown in Panel A of Table 2, Model 3 fits the data well and is significantly better fitted than Model 2 ($\chi^2_{\text{diff}} = 10\ 74$, d f $_{\text{diff}} = 2$, $p <$ 01) This significant difference between models indicates that the predicted interactions explain additional variance in beliefs Thus, H_{3a} is supported, the ad campaign attitude × prior trial behavior interaction term positively affects and incrementally explains 2% of the variance in beliefs However, the coefficient for the interaction of social influence and ad campaign attitude is not significant and thus does not support H_{3b}

Effects on Intent to Smoke

H_4–H_5 Direct effects We predict that prior trial behavior (H_{4a}) and social influence (H_{4b}) have positive effects on intent to smoke, and tests of the predictions are presented in Model 1, Panel B, in Table 2 Model 1 fits the data well and supports these predictions, as both prior trial behavior and social influence are significant predictors and explain 41% of the variance in intent to smoke We also predict that ad campaign attitude (H_5) negatively affects intent and explains variance in addition to the effects of prior trial behavior and social influence Model 2 in Panel B of Table 2 supports this hypothesis Model 2 has a better fit than Model 1 ($\chi^2_{\text{diff}} = 39\ 12$, d f $_{\text{diff}} = 1$, $p <$ 01), and all three constructs (prior trial behavior, social influence, and ad campaign attitude) affect intent in the predicted direction The addition of ad campaign attitude has a negative effect on intent and explains an additional 3% of the variance in this construct

H_6 Interaction effects of ad campaign attitude on intent H_6 predicts that ad campaign attitude interacts with prior trial behavior and social influence such that ad campaign attitude has a stronger (and more negative) influence on intent to smoke for adolescents with prior trial behavior (H_{6a}) and with social influence (H_{6b}) Thus, we anticipate that the interaction terms ad campaign attitude × prior trial behavior and ad campaign attitude × social influence are negative and significant predictors of intent to smoke We added the mean-centered interaction terms hierarchically to the predictors already in Model 2 to create Model 3 Model 3 fit better than Model 2 ($\chi^2_{\text{diff}} = 71\ 80$, d f $_{\text{diff}} = 2$, $p <$ 01), which suggests that the addition of the interaction terms explains incremental variance in intent Both the ad campaign attitude × prior trial behavior and the ad campaign attitude × social influence interaction terms are significant

TABLE 2
Hierarchical SEM Results for Antismoking Beliefs and Intent to Smoke

A. Results with Antismoking Beliefs as Dependent Variable (n = 943)

	Fit Estimates						
	χ^2	d f.	χ^2_{diff}	d.f $_{diff}$	CFI	NNFI	RMSEA
Model 1	104 30	19	—	—	96	95	07
Model 2	40 09	18	64 21***	1	99	98	04
Model 3	29 35	16	10 74***	2	99	98	03

	Direct Effects Only		Direct and Interaction Effects
	Model 1	Model 2	Model 3
PB → beliefs	– 10 (– 14)***	– 07 (– 10)***	– 06 (– 08)***
SI → beliefs	– 03 (– 09)**	– 02 (– 05)*	– 01 (– 05)
ACA → beliefs		04 (30)***	03 (21)***
ACA x PB → beliefs			04 (16)***
ACA x SI → beliefs			– 01 (– 04)
R^2	05	13	15

B. Results with Intent to Smoke as Dependent Variable (n = 924)

	Fit Estimates						
	χ^2	d f.	χ^2_{diff}	d f.$_{diff}$	CFI	NNFI	RMSEA
Model 1	346 44	49	—	—	93	92	08
Model 2	307 32	48	39 12***	1	94	93	08
Model 3	235 52	46	71 80***	2	95	91	06

	Direct Effects Only		Direct and Interaction Effects
	Model 1	Model 2	Model 3
PB → intent	70 (49)***	67 (47)***	63 (44)***
SI → intent	15 (21)***	14 (19)***	12 (16)***
ACA → intent		– 04 (– 18)***	– 01 (– 03)
ACA x PB → intent			– 10 (– 22)***
ACA x SI → intent			– 03 (– 09)***
Beliefs → intent			
R^2	41	44	48

*p < 10
**p < 05
***p < 01
Notes Paths not in parentheses are unstandardized, and paths in parentheses are standardized PB = prior trial behavior, SI = social influence, and ACA = ad campaign attitude

($p < 01$) and negative, as we predicted, in support of H_6 The interaction terms explain an additional 4% of the variance in intent to smoke [3]

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[3] Given the four advertisement themes, three belief themes, and three types of social influence (friends, siblings, or adults in the home), we conducted several analyses that disaggregated the ad campaign attitude, beliefs, and social influence measures First, in general, attitudes toward each of the four campaign advertisements were consistent and favorable, mean scores on a zero-to-ten scale ranging from 7 04 to 7 78 Correlations of the attitude measure for each of the four specific advertisements with the beliefs measure ranged from 20 to 29 ($p < 01$) and from – 23 to – 27 ($p < 01$) for the intent measure

Second, because specific advertisements of the campaigns were more closely related to tobacco company deceptive practices, we also estimated all models shown in Tables 2 and 3 with only deceptiveness of the tobacco companies as the beliefs measure In terms of statistical significance and coefficient magnitude, all independent variables that predicted beliefs (using only the deceptiveness measure) were similar to the ones in Tables 2 and 3 Use of the deceptiveness measure as a predictor of smoking intent also yielded similar results to the ones in Tables 2 and 3 Third, we analyzed each social influence separately The results are similar to the ones in Table 2 for beliefs and intent, with the exception that the ad campaign attitude × friends interaction term affected

To explore the specific nature and implications of these interactions further, we examined correlational results for (1) adolescents with and without prior smoking trial behavior and (2) adolescents with and without social influence For adolescents with prior trial behavior, the correlation of ad campaign attitude with intent to smoke is – 38 ($p <$ 01), and for adolescents without prior trial behavior, the correlation is – 07 ($p <$ 05, one-tailed test) The difference in the correlations between ad campaign attitude and intent for adolescents with and without prior trial behavior is statistically significant (t = 4 52, $p <$ 01) For adolescents with social influence, the correlation of ad campaign attitude with intent is – 35, and for adolescents without social influence, the correlation is – 06 (t = 4 63, $p <$ 01) These correlational differences are consistent with the significant interaction terms between prior trial behavior and ad campaign attitude and between social influence and ad campaign attitude, shown in Panel B of Table 2 As we hypothesized, they suggest that a favorable campaign attitude has a stronger (and more negative) impact on intent to smoke for adolescents with prior trial behavior and for adolescents exposed to social influence [4]

H_7 Effects of beliefs on intent and mediation analyses To determine whether the beliefs construct mediates the effects of prior trial behavior, social influence, ad campaign attitude, ad campaign attitude × prior trial behavior, and ad campaign attitude × social influence on intent, four conditions must hold (1) The predictor variables (prior trial behavior, social influence, ad campaign attitude, ad campaign attitude × prior trial behavior, and ad campaign attitude × social influence) must affect the mediator (beliefs) in the predicted direction, (2) the mediator (beliefs) must affect the dependent variable (intent to smoke) in the predicted direction, (3) the predictor variables must affect the dependent variable (intent to smoke) in the predicted direction, and (4) the impact of the predictors on the dependent variable (intent to smoke) must be not significant (full mediation) or reduced (partial mediation) after controlling for the mediator (beliefs) (Baron and Kenny 1986, Holmbeck 1997)

The first two conditions are largely satisfied by Model 1 (the fully mediated model) in Table 3 Consistent with the previous analyses, all predictor variables (with the exception of ad campaign attitude × social influence) affect beliefs, and beliefs affect intent The effect of beliefs on intent supports H_{7a}, and this model also shows adequate fit indexes The third condition is satisfied by Model 2, in which the predictor variables affect the dependent variable As is shown in Table 3, this "predictor variable affects dependent variable" model estimates only the effects of the predictor variables on the dependent variable of intent This model fits well, and with the exception of the ad campaign attitude → intent path, all predictor variables affect intent The fourth condition is satisfied if the effects of the predictor variables (prior trial behavior, social influence, ad campaign attitude, ad campaign attitude × prior trial behavior, and ad campaign attitude × social influence) on the dependent variable (intent) become nonsignificant when controlling for the effects of the mediator Model 3 (no-mediation model) in Table 3 accounts for the effects of the predictor variables on the proposed mediator (beliefs) and for the effect of the mediator on the dependent variable If full mediation exists, the fit of Model 3 (no mediation) should not be significantly better than the fit of Model 1 (fully mediated), and the path estimates of Model 3 for the predictor variables to the dependent variable should not be significant As is shown in Table 3, this is not the case The fit of Model 3 is significantly better than the fit of Model 1 (χ^2_{diff} = 363 29, d f $_{diff}$ = 5, $p <$ 01), and four of the five Model 3 paths from the predictor variables to the dependent variable are significant Furthermore, the paths are virtually identical in magnitude to the paths of Model 2 (in which the mediator is not included), which suggests that the paths also are not partially mediated In summary, the effects of prior trial behavior, social influence, ad campaign attitude, ad campaign attitude × prior trial behavior, and ad campaign attitude × social influence on intent are not mediated by beliefs, and H_{7b} is not supported Therefore, the moderating effects of ad campaign attitude on prior trial behavior and social influence on intent remain after we introduced beliefs as a mediator in the model [5]

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beliefs, and the ad campaign attitude × sibling and the ad campaign attitude × adult interaction terms did not The ad campaign attitude × prior trial behavior term remained significant for intent across all disaggregated social influence models

Finally, it is important to know whether there are any differences in the relative abilities of the four advertisement themes to predict smoking intent for adolescents who had and had not tried smoking in the past For adolescents who had not tried smoking, the correlations of each advertisement with intent ranged from – 03 ("Mohammed") to – 08 ("Janet"), without any significant differences across the correlations (Cohen and Cohen 1983) For adolescents who had tried smoking, the correlations of each advertisement with intent ranged from – 24 ("FACT") to – 46 ("Mohammed"), again without any significant differences across the correlations

[4] We also performed similar tests for the beliefs measure For adolescents with prior trial behavior, the correlation of ad campaign attitude with beliefs is 47, for adolescents without prior trial behavior the correlation is 20 (t = 4 05, $p <$ 01) For adolescents with social influence, the correlation of ad campaign attitudes with beliefs is 34, for adolescents without social influence the correlation is 24 (t = 1 67, $p <$ 05, one-tailed test) As with intent, the results suggest that a favorable ad campaign attitude has a greater positive impact on antismoking beliefs for adolescents with prior trial behavior and social influence

[5] Partial mediation is supported if the effects of the predictors on the dependent variable are significantly diminished after accounting for the mediator Thus, we tested whether the regression coefficients for social influence, ad campaign attitude, ad campaign attitude × prior trial behavior, and the ad campaign attitude × social influence were lower when we controlled for the effect of beliefs Using linear regression and equations suggested by Kenny, Kashay, and Bolger (1998), we found that partial mediation was not statistically supported for any predictor variable That is, there were no significant differences between the predictor variable coefficients with or without the effects of beliefs being controlled

We attempted to test the extent to which common methods variance affected our results using Netemeyer and colleagues' (1997)

Table 3
Results of Mediation Analysis

Fit Estimates	χ^2	d f.	χ^2_{diff}	d.f.$_{diff}$	CFI	NNFI	RMSEA
Model 1	462 88	45	—	—	90	80	09
Model 2	235 52	46		—	95	91	06
Model 3	99 59	40	363 29***	5	99	97	04

	Model 1 Fully Mediated	Model 2 PV Affects DV	Model 3 No Mediation
PB → beliefs	− 08 (− 12)***		− 06 (− 08)***
SI → beliefs	− 02 (− 05)*		− 02 (− 04)
ACA → beliefs	03 (21)***		03 (21)***
ACA × PB → beliefs	05 (20)***		05 (18)***
ACA × SI → beliefs	− 01 (− 03)		− 01 (− 04)
PB → intent		63 (44)***	61 (43)***
SI → intent		12 (16)***	11 (15)**
ACA → intent		− 01 (− 03)	00 (− 01)
ACA × PB → intent		− 10 (− 22)***	− 09 (− 19)***
ACA × SI → intent		− 03 (− 09)***	− 03 (− 10)***
Beliefs → intent	− 71 (− 36)***		− 31 (− 16)***
R^2			
Beliefs	16		15
Intent	21	48	51

$^{*}p < 10$
$^{**}p < 05$
$^{***}p < 01$

Notes Paths not in parentheses are unstandardized, and paths in parentheses are standardized PV = predictor variable, DV = dependent variable, PB = prior trial behavior, SI = social influence, and ACA = ad campaign attitude

Discussion and Implications

Given estimates that 6 4 million of today's adolescents are likely to die prematurely because of their decision to smoke cigarettes, and given the continuing promotional activities of tobacco companies (CDC 2002), furthering the understanding of the effectiveness of countermarketing campaigns in reinforcing antismoking beliefs and in reducing adolescent smoking intent is important Our research used a field study for a $6 5 million antismoking campaign to address two primary questions (1) Do counteradvertising campaign attitudes directly affect antismoking beliefs and intent in a manner similar to that of conventional advertisements? and (2) Can ad campaign attitudes have a stronger effect on beliefs and intent for adolescents with prior smoking trial behavior and for adolescents exposed to social influence (i e , friends or siblings who smoke or an adult smoker in the home)? Our results suggest that the answer to both questions is yes, because ad campaign attitudes, prior trial behavior, and social influence all directly affected antismoking beliefs and intent to smoke Furthermore, ad campaign attitude interacted with prior trial behavior to strengthen antismoking beliefs, in turn, ad campaign attitude also interacted with social influence and prior trial behavior to attenuate adolescent intent to smoke On the basis of our results confirming eight of ten hypotheses, we found considerable support for the proposed relationships We discuss implications of these results next

Implications for Counteradvertising Programs and Public Policy

Direct and indirect effects Our study offers implications for advertisers, social marketers, the public health community, and public policy officials on the use of counteradvertising to affect message-related beliefs and intent These implications stem from the direct, indirect, interaction, and mediating effects that we found in the study Given the direct and strong effect of prior smoking trial behavior on intent, our study suggests that similar antismoking campaigns can be used to help reduce continued smoking experimentation by adolescents Creative ways of reducing continued trial may affect intent for adolescents both directly and indirectly through the networks of friends who smoke For example, although many antismoking cam-

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procedures Tests for common method effects using SEM required direct (linear) effects and multiple-item measures for the constructs Given these requirements, we estimated the potential biasing impact of common methods for the beliefs → intent path With this test, we found no evidence that common methods variance attenuated the beliefs → intent path

We also conducted analyses to assess the effects of some key variables that we did not include in our model estimation (e g , price of cigarettes, parental vigilance, academic performance, parents' education level) Our analyses revealed that the omitted variables were not likely to account for the effects we report in our model estimation The analyses are also available on request paigns have focused primarily on cognitive-based reasons not to smoke, recent results suggest that affective approaches may be beneficial in counteracting favorable images for peers evoked in cigarette advertising (Pechmann et al 2003, Perrachio and Luna 1998) Such an approach was used in our campaign and is consistent with work on understanding persuasion influence (Friestad and Wright 1994) We also found that adolescents' antismoking beliefs can be directly influenced by attitudes toward campaign advertisements The incremental variance in beliefs explained by this campaign-related affective construct (8%) again demonstrates that well-designed antismoking campaigns can affect adolescents' smoking-related beliefs (Siegel and Biener 2000)

Interaction effects Our study extends findings from other field studies by examining how ad campaign attitude interacts with prior trial behavior and social influence Our results show that ad campaign attitude attenuates the influence of prior trial behavior on antismoking beliefs and intent to smoke There also is partial support for the interaction effect of the ad campaign attitude construct for social influence in the case of intent, but not for antismoking beliefs, only the ad campaign attitude × friends interaction term had a significant and positive effect on antismoking beliefs However, this latter finding indicates that counteradvertising campaigns, such as the one used in the present study, can be successful in lessening the influence of smoking peers on adolescent smoking beliefs held The ad campaign attitude × friends interaction also helps extend prior research on the direct impact of antismoking advertisements on both adolescent health-risk beliefs (Pechmann et al 2003) and adolescent antismoking beliefs (Pechmann and Knight 2002) However, overall (i e , across all social influence types), it should be noted that the strength of ad campaign attitude is similar in our study for adolescents with and without social influence

For smoking *intent*, results from Table 2 suggest that a favorable ad campaign attitude operates primarily through a negative impact on smoking intent for adolescents with prior smoking experience and for adolescents with social influence Because these at-risk segments have developed a stronger intent to smoke, a greater opportunity exists to reduce smoking intent through antismoking ad campaigns, such as the one used in the present study In total, our results show that the interaction effects with antismoking campaign attitude explained an additional 4% of the variance in intent to smoke

Our interaction results are also consistent with recent experimental work by Pechmann and colleagues (2003, p 9), who use advertisements with social disapproval messages Their results suggest that special strategies and executions may be needed for adolescents who are susceptible to becoming smokers on a more permanent basis or who consider themselves invulnerable to long-term risks In our case, we found success for executions that stressed industry deception and harmful effects through the use of advertising spokespeople In general, we view our results that favorable campaign attitudes have stronger negative effects on smoking intent for segments with prior experience and close exposure to smokers as supportive for the potential of positive outcomes for carefully designed countermarketing campaigns However, such positive outcomes have not always been found (cf Romer and Jamieson 2001), and the direct measurement of important influencing factors, such as prior smoking trial behavior and social influence, should be considered so that the potential effectiveness of campaign efforts is not diluted

Mediation effects We also hypothesized that antismoking beliefs would partially mediate the effects of social influence, ad campaign attitude, and the interactions of campaign attitude with prior trial behavior and social influence on intent Although the results show that beliefs failed to mediate the ad campaign attitude and interaction effects even partially, they suggest a potentially important implication That is, ad campaign affect can have a significant and negative impact on personal smoking intent that is not accounted for by antismoking beliefs, especially for adolescents who could benefit most from the campaign (i e , ones with prior smoking trial or exposed to social influence) The effect of the ad campaign attitude interactions coupled with the significant, direct (but not mediating) effect of beliefs on intent also suggests that the affective and cognitive aspects related to a countermarketing campaign can operate independently of each other in terms of their effects on consequences (Schwarz 1990) Moreover, our results are consistent with prior adolescent smoking research that demonstrates the importance of affective reactions in the evaluation of smoking and antismoking stimuli (cf Pechmann and Knight 2002, Romer and Jamieson 2001)

Contributions to Marketing Knowledge

It has been proposed that affective responses to advertising can interact with product usage experience, and the relative influence of each is dependent on the product category and other contextual factors (Vakratsas and Ambler 1999, p 36) Consistent with this view, our direct effects show that for a highly visible, mature product category such as cigarettes, prior behavior and social influence strongly influence intent However, our results also indicate that cognitive ad campaign outcomes (e g , antismoking beliefs related to the campaign) can have direct effects on intent to smoke, whereas affective ad campaign outcomes (e g , ad campaign attitude) can have important interaction effects on intent to smoke Such separate processing routes are consistent with tenets of the elaboration likelihood model, which shows that one's elaboration on affect can be as persuasive at times as that of cognitive beliefs (Petty and Cacioppo 1986, pp 213–14) Thus, although a counteradvertising campaign attempts to convince target consumers *not* to engage in a particular behavior, the results support the hypothesized interactions between affective campaign responses and both prior trial behavior and social influence effects As such, our study extends prior research on advertising effects (Vakratsas and Ambler 1999) to (1) a counteradvertising campaign and (2) prior trial behavior and social influences that encourage intent In addition, an examination of our model of counteradvertising, prior trial behavior, and social influence indicates that it is capable of accounting for a substantial portion (i e , 48%) of variance in smoking intent

Further Research

As reviewed by Pechmann (1997, p 198), a variety of approaches have been used to study the effects of antismoking ad campaigns, and now include cross-sectional (Romer and Jamieson 2001) and longitudinal (Popham et al 1994) field studies, controlled lab experiments (Pechmann and Knight 2002, Pechmann et al 2003), and qualitative research (Peracchio and Luna 1998) In our study, we used cross-sectional field data for a six-month counteradvertising campaign Although our results are encouraging, the cross-sectional design prohibits us from drawing causal inferences Longer-running field studies with longitudinal data that use the same set of respondents are desirable and could provide insight into long-term cessation rates and overall levels of smoking among adolescents (Schar and Gutierrez 2001) (For example, the CDC [1999] recommends media campaigns of several years to achieve behavioral outcomes for actual smoking rates) Other field studies could have respondents keep ad diaries, or "metered" exposure data could be obtained for some time period, and effects on subsequent cessation and initiation rates could be assessed In addition, in the case of actual antismoking field campaigns, researchers (with input from state tobacco control boards) must weigh the appropriate mix of counteradvertising campaign messages with other beneficial programs (e g , school-based programs, community outreach efforts) to determine the most efficient use of the funds available for adolescent smoking prevention and cessation Experimental research, varying exposure levels over different time frames and regions, may also provide insight into the relationships tested in this study by measuring attitudes and intent across groups with and without prior behavior In general, research has shown that negative information has stronger effects than positive information because it may be viewed as more diagnostic in decision making (Kahneman and Tversky 1979) Experiments designed to address the impact of antismoking information presented in the context of pro–tobacco company promotions across adolescents with and without prior trial behavior and social influence would be of interest (cf Pechmann and Ratneshwar 1994)

Other research might consider variables not measured in our study For example, increases in price are believed to reduce adolescent intent and behavior with respect to smoking (Chaloupka et al 2002) Thus, the strength of a pricing effect relative to long-term advertising effects and the ability of marketing-mix variables to complement one another would be of interest On a broader level, the marketing and public health literature on how outcomes of countermarketing media campaigns may moderate the positive effects of prior experience and social and family influences on intent and long-term behavior is in need of greater study Comprehensive prevention programs (including countermarketing campaigns) might examine other factors such as school misbehavior and academic failure (Bryant et al 2002), positive parental involvement (Simons-Morton 2002), and related problem behaviors in an effort to help reduce adolescent smoking intent and use In addition, further research might address similar direct, interacting, and mediating effects for other adolescent countermarketing campaigns that involve drug and alcohol consumption (Block et al 2002, Rose, Bearden, and Manning 1996) Finally, our study findings point to the importance of accounting for key underlying characteristics of the target population in the assessment of countermarketing campaigns Studies that examine general adolescent populations while ignoring the measurement of important factors such as prior trial behavior and social influence may mask significant effects of the campaign In summary, we encourage the consideration of these issues to help improve the understanding of the problem consumption behaviors of adolescents while enhancing future consumer and societal welfare

Appendix
Measurement Items

Social Influence

Do you have any brothers or sisters who currently smoke cigarettes? (Sibling)

Is there an adult in your household who is a regular smoker? (Adult smoker)

How many of your four closest friends smoke cigarettes? (Friends)

Prior Trial Behavior

Have you ever tried cigarette smoking, even one or two puffs?

Ad Campaign Attitude

For each of the four specific advertisements in the campaign, respondents were asked, "How much did you like the advertisement?"

Antismoking Beliefs

Tobacco Company Deception Beliefs

Tobacco companies specifically try to get young people to start smoking

Tobacco companies fool young people into believing smoking is okay

Tobacco companies encourage people to start smoking

Tobacco companies use deceptive practices to get people hooked on smoking

Secondhand Smoke Beliefs

Breathing smoke from someone else's cigarette is harmful

Secondhand smoke is dangerous to nonsmokers

Secondhand smoke is not as dangerous as people make it out to be (Reverse coded)

Secondhand smoke kills people

Smoking Addictiveness Beliefs

Smoking is addictive

Nicotine is physically addictive

Tobacco is a deadly product in any form

Tobacco is a dangerous product

Intent to Smoke

If one of your best friends offered you a cigarette, would you smoke it?

Do you think you will smoke a cigarette at anytime during the next year?

Do you think you will be smoking cigarettes five years from now?

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Book Reviews

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An Accidental Venture into Academics

In the summer of 2002, Terry Clark asked me to write an essay about the history and development of my professional activities Although I was flattered, I also realized that this must be a sign that I had reached a mature, sometimes confused with wise, stage of my life cycle I delayed informing others about my maturity by waiting a year to complete this essay However, unless the biomedical innovations with regard to aging accelerate rapidly, I need to be realistic At this point, I still have the time and wherewithal to ponder new options Besides, the process of reflection might be instructive

The title of my essay is intended to convey that seemingly random events have exerted major influences in my life It is well known that we have little control over many aspects of our lives Our diverse genetic makeup is fixed to a large degree, and we face extensive heterogeneity in the opportunities available to us Nevertheless, there is a lot we can do to shape our lives I will attempt to illustrate by reviewing my own state of affairs

The Netherlands

I grew up in a family and a culture dominated by a Calvinistic work ethic Family life was dominated by my father's bakery, in part because the production facility was in the back of the house and the retail outlet in the front All family members were expected to assist with the business when needed, therefore, demands on my time could occur any day I returned from school To minimize the chance, I often joined friends after school to spend time at their homes or to play soccer Broader family gatherings were important, and in the presence of extended family members, my father seemed intent on demonstrating that he had achieved at least as much financial success as two uncles with university degrees had

Although neither of my parents had gone to high school, they seemed to believe that education would be critical to *my* future success In the Netherlands, the most selective secondary school option was required for entry into universities A second option was intended to provide the basis for low- and midlevel professional careers and a third one for skilled labor The Department of Education mandated that all primary school children be evaluated during their last year with respect to their potential for the three options The counselor who saw me was probably conscious of social classes, and my parents' modest education may have influenced him to recommend that I attend the school for skilled labor However, he added that if my parents felt strongly about it, the second option might be suitable Because neither of these options was consistent with my grades, I give my parents credit for ignoring this advice Their decision to send me to the highest level of secondary education was especially important given that I had no interest in succeeding my father in his business The uncertainties of a small business presented obvious pitfalls, and I vowed that my own family would enjoy a home life separate from business

Toward the end of my secondary education, I contemplated studying economics University study, heavily subsidized by the state, was a risky activity in the 1960s About half the students in Holland failed to continue after the first or second year, and most graduates took longer than the norm of five to six years for the equivalent of a master's degree[1] I decided to pursue an unconventional option instead and applied for admission to Nyenrode, a private college created after World War II to prepare students for careers in international business, with financial support from companies such as Philips, Shell, and Unilever Course content placed heavy emphasis on macro- and microeconomics and foreign languages including English, French, German, Spanish, and Swedish There were also ample opportunities for participation in a wide range of sports and other activities designed to enhance social skills

A week before graduation from Nyenrode, I was invited to return to campus for an interview related to a scholarship for study abroad I was planning to stay in the Netherlands

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[1] Higher education in the Netherlands has undergone major reorganizations during the past two decades For example, undergraduate programs now exist, and students have the option to apply for graduate study after they receive a bachelor's degree

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to pursue a career in accounting. Because accounting conventions differed widely between countries, I argued that the scholarship was irrelevant to me. However, on graduation day, the college president informed me that I had won the scholarship on the basis of my exam scores. He asked that I simply accept the prize during the ceremonies and decide later whether I would actually use it. He knew I was due for up to two years of compulsory Dutch military service and would have ample time to consider it.

During a one-year officer-training program, I discussed professional options with my fiancée and with fellow trainees who were mostly law and economics graduates. Everyone agreed that it would be a mistake for me not to accept the scholarship. My fiancée and I decided we should complete a year of marriage before we embarked on a foreign venture. She initially favored European options, such as graduate study in economics at Sankt Gallen in Switzerland. However, America beckoned.

The United States

Although a scholarship made it easier to justify going abroad, the actual benefits were still unclear to me. Nevertheless, I accepted admission to a program at the University of Oregon. Because marketing was considered especially strong in the United States, I abandoned my interest in accounting and chose to concentrate instead in marketing. During my first quarter at Oregon, I took a course in statistics from James Reinmuth, who made complex material understandable and interesting. I ended up taking many more statistics courses and far fewer marketing courses than I had initially intended during two years of study at Oregon. My plan was to return to Holland or at least Europe, perhaps to work in market research for Philips or Unilever or to join a consulting firm. Just when I began contemplating options, two things interfered.

First, my wife Marian now preferred to stay in the United States. I might have persuaded her to return to Europe, but because she had joined me reluctantly when I chose the United States over Switzerland, it did not seem fair for me to ask her to move in both directions across the Atlantic against her preferences. She had worked full-time while I studied, and her interests deserved full consideration in our decisions. Before we married, her mother asked me whether I was sure Marian was the "right one" for me. I must have had a mind for statistics because I remember contemplating something along the lines of the following: "Given the large number of unobservables, how could I know if she is the one? Of all the eligible females, I knew just a handful well enough to make somewhat informed judgments about their suitability." I said something like that to my future mother-in-law. However, I also emphasized that I thought Marian and I were quite compatible and that I was committed to building a strong relationship. We had been childhood sweethearts and had shown a strong interest in each other at various stages in our lives. I had read a book or two about matrimony and had formed some tentative opinions on the characteristics of successful and happy marriages. Happy marriages seemed to depend especially on the compatibility of partners but also on a great deal of personal attention and flexibility by both partners. With this philosophy in mind, it seemed that it was my turn to be flexible. Thus, staying in the United States became a priority.

Second, Reinmuth suggested that I consider doctoral study. Although the thought had not crossed my mind, the idea was sufficiently intriguing for me first to try full-time teaching. I obtained one offer at a public college in Washington State, where I taught mostly statistics for two years. Research had fascinated me already. For example, I did a laboratory experiment with a fellow student on odd pricing, and Reinmuth proposed to combine a project I had completed with his own research, which several years later resulted in my first publication (Reinmuth and Wittink 1974).

I was especially intrigued by the doctoral programs at Northwestern and Purdue. I chose Purdue because it seemed to fit better with my interests. Still, during the second year of the three-year program, I had doubts about my ability to complete it. My wife convinced me to continue (or perhaps she said that quitting was unacceptable). Our daughter, who was two years old when I started the doctoral program, also played an important role. She would often accompany me during the weekends on visits to the computer center where I did batch processing of programs. She enjoyed playing with IBM punch cards and drawing on computer output.

Purdue's Krannert School had achieved a strong reputation because of Frank Bass and Mike Pessemier. In the fall of 1974, my cohort received one or more offers from a variety of schools, including Berkeley, Carnegie, Chicago, Harvard, MIT, Northwestern, Stanford, and Wharton. I accepted the offer from Stanford partly because of its research excellence across fields and the presence of marketing scholars such as Dave Montgomery, Mike Ray, Seenu Srinivasan, and Peter Wright. Interestingly, although I would join the marketing group, my job was actually to teach statistics and econometrics. Marian gave birth to our second child at about the same time I defended my thesis.

Research

Stanford

During the doctoral program, much of my research interest focused on econometric models, including the latest methods for pooling cross-sectional and time-series data (Bass and Wittink 1975), and I pursued interaction effects between price and advertising (Wittink 1977, see also Kaul and Wittink 1995). At Stanford, Dave Montgomery and Seenu Srinivasan pursued customer preference (conjoint) measurement. This emerging research activity offered interesting opportunities. At the time, little was known about differences in performance between, for example, alternative methods (Wittink and Cattin 1981) or external validity (Montgomery and Wittink 1980). The 1981 paper I coauthored with Philippe Cattin was initially rejected by *Journal of Marketing Research* (*JMR*) in 1976. It remained on the shelf for four years until a colleague suggested that we resubmit it to the same journal.[1]

An important mentor of mine was Richard Johnson. My first meeting with Rich was at Market Facts in Chicago, where he had developed an attribute trade-off approach that focused on two attributes at a time (Johnson 1974). He had an application that involved characteristics of life partners to interest potential users in conjoint applications.

Other research projects included a survey of commercial practices (Cattin and Wittink 1982) and an application to the marketing of arts programs (Currim, Weinberg, and Wittink 1981). The design of the latter study had three attributes with three levels and three attributes with two levels. The empirical results suggested a strong artificial effect that I focused on in various projects (e.g., Steenkamp and Wittink 1994; Wittink, Krishnamurthi, and Nutter 1982; Wittink, Krishnamurthi, and Reibstein 1990; Verlegh, Schifferstein, and Wittink 2002).

I fondly recall making a presentation at the first Advanced Research Techniques Forum on the number-of-attribute-levels effect that at that time had been shown to exist only for full-profile and trade-off matrix designs (Wittink 1991). Joel Huber asked publicly if I thought the effect would apply to adaptive conjoint analysis (ACA) (Johnson 1987). In some sense, ACA was based on Johnson's trade-off matrix approach; it customizes trade-off questions based on self-explicated data. I suggested that the number-of-attribute-levels effect might not apply to ACA. Joel suggested that it would. After my presentation, two practitioners offered to join us for a study. We designed an experimental study with four treatments, each of which had two options (see Huber et al. 1993). The empirical results for the number-of-levels effect showed that Joel was correct. ACA also showed a number-of-levels effect (Wittink et al. 1992), but its magnitude was much smaller than it was for full profile. Interestingly, we also found that the effect did not need to occur in ACA. In subsequent versions of ACA, Johnson modified the integration of self-explicated data with paired preference intensity judgments, and this modification reduced the number-of-levels effect further (Orme 1998).

An important element of my time at Stanford consisted of the development of an econometric model to aid the MBA student admission process. The idea was to relate academic performance in the MBA program to many predictors, including GMAT scores, undergraduate grade point average, and a measure of the quality of the undergraduate institution. The project spanned multiple years and included the difficulty of obtaining cooperation from successive admission directors. A working paper (never submitted for publication) discusses important issues regarding measurement, model specification, estimation, and validation (Srinivasan, Wittink, and Zweig 1981). We proposed a two-stage process for admission decisions. In the first stage, a model-based prediction of each applicant's probability of failing to satisfy minimum requirements in the quantitative and/or the managerial components in the core MBA program is obtained. Applicants with high failure likelihoods would be eliminated. In the second stage, the admission director could focus primarily on the remaining candidates' career potentials. Seenu was the primary architect, and it was a privilege for me to work with him on this project.

My Stanford period also included the Market Measurement and Analysis Conference that Dave Montgomery and I organized in 1979 on a suggestion by Frank Bass. We proposed to have select academics and practitioners interact about research. This conference is now considered the first Marketing Science conference (see Wittink 2001).

During my sixth year at Stanford, Cornell offered me a position with tenure. Marian and I decided that upstate New York is an idyllic environment in which families thrive. Another rationalization for the move was that we believed that our two children would benefit from exposure to the seasons, and Holland would be easier to visit. I am sure that the uncertainty of tenure at Stanford played no role, yet I do recall a discussion with junior-faculty colleagues at Stanford about prospects for tenure, partly as a result of the frequent failures of internal candidates to be promoted. A nonmarketing colleague told me that if I just ignored my family for the remaining time, tenure would be attainable. We moved to Ithaca in 1981.

Cornell

For various reasons, including my acceptance of administrative responsibilities, and the onset of severe medical problems, my research output declined during the first part of my time at Cornell. A sabbatical leave in 1988–89, spent at Northwestern's Kellogg School and at the Faculty of Economics of the University of Groningen in the Netherlands, was critical to the reinvigoration of my research activities. My visit in Holland showed that Peter Leeflang had created a research culture that rivaled the best in the United States, and we embarked on various projects, including competitive reaction research (Leeflang and Wittink 1992, 1996, 2001). The reemergence of my interest in research was also facilitated by the availability of scanner data. In the mid-1980s, I accepted an invitation from ACNielsen to work on the development of a price-promotion model based on weekly store-level scanner data. My work at ACNielsen culminated in a paper submitted to *JMR* that describes the initial promotion model along with empirical results. Rejection of the SCAN*PRO paper (Wittink et al. 1988) by *JMR* was swift. Because there was no new estimation methodology, the reviewers argued that the paper was not suitable for the journal. Still, the model appears to satisfy Little's (1970) criteria for structure. It is simple, complete, adaptive, and robust. I regret that my coauthors and I never sent the paper elsewhere. Quite a few years later, Don Morrison, who had nothing to do with the rejection at *JMR*, provided some redemption when he opined that this paper should have been published (for research that uses empirical results in the working paper, see Morrison and Silva-Rossa 1995).

The SCAN*PRO model provided a basis for further research. For example, Christen and colleagues (1997) show the bias in a model of linearly aggregated data when the model of disaggregate data is nonlinear. Foekens, Leeflang, and Wittink (1999) show how promotion effects depend on the frequency and intensity of previous price discounts. The inclusion of dynamic effects is also a way to address the Lucas (1976) critique. Van Heerde, Leeflang, and Wittink (2000) show that cross-period effects can be obtained in models estimated from store data. Van Heerde, Leeflang, and Wittink (2001) use semiparametric estimation of promotion effects to show that these effects have complex main (and crossover) interaction effects. They also demonstrate superior predictive validity of the semiparametric approach relative to traditional approaches Van Heerde, Leeflang, and Wittink (2002) describe the evolution of research related to SCAN*PRO

I am particularly excited about two recent articles that build on the innovative and award-winning research by Sunil Gupta (1988) Much of the development in these two articles is due to the highly capable work of Harald van Heerde, a highly competent econometrician by training and a terrific research colleague In one article, Van Heerde, Sachin Gupta, and Wittink (2003) transform the well-known household data–based *elasticity* decomposition result, which has been misinterpreted as reporting that the vast majority of the *sales* effect is due to brand switching, into a unit-sales decomposition In the other article, Van Heerde, Leeflang, and Wittink (2005) show that substantively meaningful unit-sales decompositions can also be obtained from store data The framework in the latter article is extremely powerful and attractive

My association with Peter Leeflang continues to be productive We completed a book on model building (Leeflang et al 2001), a revision of the highly regarded book he and Philippe Naert completed when quantitative model building in marketing was in its infancy (Naert and Leeflang 1978) My research association with Peter was formalized with an honorary faculty appointment at the Department of Economics of the University of Groningen in 1993, and I received a great accolade for my research when I was elected to the esteemed Royal Dutch Academy of Sciences in 2001

In 1990, Cornell had the privilege of attracting Pradeep Chintagunta to join the faculty Pradeep is highly capable, enormously productive, and a superb colleague His departure for the University of Chicago in the mid-1990s was a severe professional and personal loss for me Both of us worked with Cornell's strong cadre of doctoral students, and I want to acknowledge especially Sachin Gupta, with whom both of us worked extensively (Gupta, Chintagunta, and Wittink 1997, Gupta et al 1996)

In the mid-1990s, I began working with Ed McLaughlin at Cornell's Department of Agricultural Economics This department has a strong marketing component with extensive contacts in several industries, especially the food industry Ed and I have worked with associates on customer satisfaction research (Gomez, McLaughlin, and Wittink 2004, Sirohi, McLaughlin, and Wittink 1998), and we are now extending the research with enhanced data from the food industry Another association that is important to me is that with my fellow doctoral student at Purdue Dave Reibstein and I worked together on conjoint analysis (Wittink et al 1989, Wittink, Krishnamurthi, and Reibstein 1990) and strategy (Keil, Reibstein, and Wittink 2001) In 2001, we co-organized a special-interest conference on competition, sponsored by the Marketing Science Institute, that will lead to a special issue of *Marketing Science*

I want to acknowledge the role of Tom Dyckman during my Cornell period Tom was a terrific mentor, and I am deeply grateful for his support I take great pride in the fact that Cornell had a much stronger and larger group of marketing faculty in the late 1990s than it had in the early 1980s, when it was known primarily for accounting and finance *BusinessWeek* (1998) placed Cornell in the top ten only in marketing So why move?

Yale

Yale is attractive for many reasons, including a strong research culture at the School of Management The transition from Cornell was amazingly smooth, and I felt immediately comfortable Ravi Dhar and Subrata Sen helped facilitate my integration into the Yale culture Importantly, we have been able to create a superb group of researchers with the additions of On Amir, Dina Mayzlin, Nathan Novemsky, and K Sudhir Another benefit is the proximity to New York City I am a partner at Blue Flame Data Inc , a firm that I cofounded with Sev Keil (see Wittink and Keil 2000) that is located in Manhattan, and my wife and I usually have season tickets to the Metropolitan Opera

My move to Yale in 1998 also spurred research in health care Patients demand a greater role in the decision-making process for chronic diseases Yet physicians do not have the time, the inclination, the ability, or the preparation to learn each patient's unique perspectives on alternative treatments that differ on multiple criteria My personal experience illustrates the problem I was diagnosed with type 1 (insulin-dependent) diabetes in 1983 My family physician presented multiple treatment options, such as daily injections and an insulin pump The latter requires the insertion of a subcutaneous device attached to a visible beeperlike instrument, a method that seemed excessively obtrusive to me at the time (I had visions of being a patient walking in a hospital with an IV bottle attached to a transportable stand) I now recognize that this perception was excessively negative partly because the autoimmune disease diagnosis depressed me, and I preferred to hide the diabetic condition However, knowledge of the severe consequences of hyperglycemia, such as cardiovascular disease and neuropathy, made it impossible for me to ignore the disease So I chose insulin injections to cover basal requirements and the expected carbohydrate intake for 24 hours at a time Choosing this option constrained my food intake in the sense that I risked hypoglycemic reactions if I did not eat at specified times My interest in minimizing the chances of severe long-term effects from persistent hyperglycemia made me favor accepting the short-term risks of hypoglycemia

I mention this for several reasons One is that having type 1 diabetes affected my life enormously Coming to grips with being diabetic reduced my research activity My wife and children were greatly affected by the multiple hypoglycemic bouts I experienced I became unconscious several times and frequently experienced reduced cognitive abilities An obvious solution to the incidence of hypoglycemia was for me to increase the frequency of self-administered blood-sugar tests It took me far longer than it should have to reach that conclusion, but I should have realized much faster that an alternative treatment would help too In the mid-1990s, I finally switched from insulin injections to the insulin pump, thanks to my wife who recommended I visit a new endocrinologist He suggested I switch to the pump for reasons of convenience However, the switch also had a favorable influence on my research productivity and reduced the total cost of treatment

The frustrating aspect is that I should have been able to discover my preference for this alternative treatment a lot sooner myself The argument is that for chronic diseases such as diabetes and arthritis, patients must take a proactive role in disease management This requires that patients become informed about the disease and about the characteristics of alternative treatments Patients should be almost as informed as physicians However, the health care system is still based on the traditional treatment of acute diseases That is, a patient visits a physician when he or she experiences a problem, the physician diagnoses the problem, and the patient follows the recommended treatment The patient is mostly passive After the initial diagnosis of a chronic disease, the patient should take charge and be an active participant in the treatment decisions Because patient preferences change over time and the available treatment options change as well, the patient should have the opportunity to consider the trade-offs between conflicting characteristics and to learn which treatment is the best fit, subject to medical constraints Patients should be able to obtain information and to consider trade-offs from a kiosk that sits in the waiting room or on the Web

By repeating a trade-off exercise periodically, the patient has a chance to discover whether changes in preferred treatment will emerge on the basis of, for example, changes in weights for relevant dimensions (as would have applied to me in the treatment of diabetes) With a continuously updated database with all relevant characteristics for alternative treatments, including new ones, patients also have the opportunity to take advantage of the latest innovations Importantly, physicians do not have the facility to detect changes in preferences As a result, most changes occur when patients switch physicians Indeed, the reason I switched to the insulin pump was the new endocrinologist's argument that I would enjoy the convenience

I am now eager to promote the idea that patients with chronic diseases, for which there are treatment alternatives that differ on multiple dimensions, have the opportunity to consider the attractiveness of characteristics on a regular basis On the basis of each individual patient's estimated preference function for treatment characteristics relevant to a given disease, the patient and the physician can learn which treatment option provides the best fit at a given time Greater patient involvement should result in greater patient satisfaction and enhanced compliance so that health outcomes will improve and total costs might decline My research with Liana Fraenkel at the Yale School of Medicine is concentrated in this area (Fraenkel, Bogardus, and Wittink 2001, 2003, Fraenkel et al 2004a, b) We are proposing to conduct experiments to demonstrate the benefits of active patient involvement The idea of proactive involvement by patients is akin to customers employing decision aids for the selection of the best product or service when there are multiple options that differ on many dimensions

Life Cycle

It is well known that faculty members tend to change the relative emphasis on research, teaching, and other activities over time Changes in activities occur because of personal preferences but also because of opportunities and institutional demands An activity that has been fairly constant over time for me is my involvement with doctoral students (Imran Currim and Lakshman Krishnamurthi at Stanford, Naufel Vilcassim, Eric Wruck, Padmini Desikachar, Rishin Roy, John Walsh, Sachin Gupta, Alok Prasad, Rahul Guha, Anil Kaul, Seethu Seetharaman, Niren Sirohi, Sumas Wongsunopparat, and Sev Keil at Cornell, Eijte Foekens, Marco Vriens, Harald van Heerde, Csilla Horvath, and Albert van Dijk at Groningen, and Tom Steenburgh at Yale)

It is not surprising that the Cornell period has the largest number of students whose theses I supervised (the ones in Holland were joint with Peter Leeflang or Michel Wedel) This period was also enormously important personally Ithaca is a family-friendly place that is conducive to having a happy marriage and happy offspring It is very important to me that my wife and children realize their own personal and professional goals The dominant professional themes in my family are health care and education My wife, originally trained as a nurse, has worked as a childbirth educator and massage therapist, is an advocate of alternative medicines, has an extensive background in Oriental healing arts, and is a dedicated yoga teacher Our daughter is a licensed doctor who is currently a research fellow focusing on geriatric depression at the University of Pennsylvania's School of Medicine Our son works at the Center for Responsive Law in Washington, D C , where one of his projects focuses on legislation related to medical malpractice Both kids are Cornell graduates, as are their spouses The diverse health-related professional activities of my family members happen to fit my own newly found predilection I recently accepted the codirectorship of a proposed Center for Health Management and Policy at Yale University

Conclusion

Each stage in my professional formation was based on choices I made However, there were many events over which I had little control that have had a major effect on my career For example, I never intended to become an academic researcher until a faculty member in statistics at the University of Oregon suggested doctoral study And the move to the United States was prompted by a scholarship for study abroad that I initially brushed aside Thus, it seemed appropriate to me to title this essay "An Accidental Venture into Academics " Without the move to the United States, I might not have chosen marketing as a field of study My interest in applied statistics and econometrics is largely due to accidental exposure to James Reinmuth and Frank Bass

My accidental venture into academics has been and continues to be a terrific experience Although I have wondered how I might have fared in business, I cannot imagine that an alternative scenario would have generated the same satisfaction Of course, if I had pursued a degree in economics in the Netherlands, I might still have ended up doing academic research

Even though I may be in the mature stage of my life, I am not yet halfway through it New activities such as the editorship of *JMR* present great challenges It is my intention to continue to conduct research and to teach for a long time to come However, I have learned to welcome seemingly accidental events that occur along the way, because they often lead to interesting developments I hope my reflections show that having an open mind and being flexible can be very rewarding Or, if preferred, I believe that I have been very lucky

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The Geography of Thought: How Asians and Westerners Think Differently ... and Why

by Richard Nisbett (New York: The Free Press, 2003, 288 pp., $24)

A casual walk down any sidewalk reveals the incredible variety of human beings Physical differences are noted and occasionally translated into salient differences in the culture or ancestry of others This propensity to sort people into cultural categories has led to stereotypes, some of which are intuitively plausible, but many of which are often unjustified and unwarranted For example, in general, Asians are regarded as reserved, shy, and reticent, though Indians and Koreans can be outright and outspoken Americans and Europeans are cast as aggressive, extroverted, and opinionated, though significant exceptions continue to be noted The stereotypes go on and, over the course of history, have resulted in cross-cultural mishaps, snafus, and human suffering

Notably, although popular cultural stereotypes abound, in general it is assumed that everyone uses the same tools for perception, for memory, and for reasoning Such an assumption was once held by the University of Michigan psychologist Richard Nisbett, also the Theodore M Newcomb Distinguished University Professor and Codirector of the Culture and Cognition Program Nisbett observed that many cognitive scientists believed that "all human groups perceive and reason in the same way" (pp xiii–xiv) Whatever skin color, nationality, or religion, a logically true statement should hold true The same should apply for graphical information, that is, everyone *should* at least see the same picture

In his provocative new book, *The Geography of Thought*, Nisbett challenges this assumption of universality or invariance across cultures Using an arsenal of experimental studies conducted mostly by himself and his colleagues, Nisbett builds a case that East Asians and Westerners think differently, and he establishes the grounds for why this is so

Prompted by a Chinese student who opined that the world is a circle, not a straight line, Nisbett embarked on an intensive reading of the comparative literature on the nature of thought by both Eastern and Western philosophers, historians, and anthropologists His finding that forms the core argument of the book is that Westerners (primarily Americans, Europeans, and citizens of the British Commonwealth) tend to be categorical They focus on particular objects in isolation from their context and believe that if they can know the rules that govern objects, they can control the objects' behavior In contrast, East Asians (principally the people of China, Korea, and Japan) tend to be broader and contextual They believe that events are highly complex and cannot be properly interpreted without considering their underlying context Moreover, because many factors determine events, they are much more difficult, if not impossible, to control The rest of the book builds on this core argument in ways to attempt to resolve current-day puzzles and contradictions pertaining to attention, perception, reasoning, causal inference, and knowledge organization

Chapter 1 explores traditional differences between Aristotle and Confucius as exemplars of Western and Eastern schools of thought Such differences are manifest in the ancient Greeks' sense of personal agency, individualism, curiosity, and debate that is held in contrast to the Chinese sense of harmony, collectivism, practicality, and self-control Greek concern for matter as particulate and separate led to distinctive ways of thinking Salient attributes of an object are identified, the attributes become the basis of categorization, and the categories become the basis for rule construction Ensuing events are understood in terms of objects behaving in accord with these rules

Because the Chinese orientation toward life is shaped by the influences of Taoism, Buddhism, and Confucianism, Chinese thinking emphasizes harmony, holism, and interrelatedness That is, every event is related to every other event The Way, or the pursuit of harmonious relationships, became the goal of philosophy Although Greek preoccupation with the discovery of the truth paved the way for the discovery of the processes of invention and science, the Chinese focus on complex interactions led to the primacy of relationships, context, and dialecticism, or the use of contradictions to understand relations among objects or events

Chapter 2 undergirds these differences in the context of the ecologies of Greece and China Early agricultural developments in China compelled people to share resources to live together in a reasonably harmonious way The mountains of Greece favored hunting, fishing, and trade, which inculcated individual skills and achievements Although agriculture reached Greece later than it reached China, by then it was commercial rather than subsistence agriculture, which thus enhanced individual skills Historically, the success of the Chinese economy and culture engendered a belief in Chinese superiority, which resulted in a lack of interest in outside intellectual and technological advances

The balance of *Geography of Thought* expands on the possible implications of cognitive differences between East Asians and Westerners Nisbett's evidence consists primarily of data from contrived experiments, many of which measure reaction times or identify salient cues in recall of previously shown objects and scenes Most of the experiments are visual, requiring subjects to identify relationships among objects, other tests are verbal and structured to infer logical rules An example is an experiment in which U S and Japanese students were shown an animated underwater scene and later queried as to what they saw What emerged was that the U S students focused on the objects (i e , big fish swimming with small fish), and the Japanese students made observations about the background environment On the basis of such studies, Nisbett reports several notable findings (the subsequent six headings correspond to the topic of Nisbett's Chapters 3–8, respectively)

In Chapter 3, "Living Together Versus Going It Alone," Nisbett discusses his finding that Westerners develop values directed at individualism (e g , "individual distinctiveness is valued," p 47) and choice (e g , "a selection of 40 breakfast cereals in the supermarket," p 49), whereas East Asians favor collectivism (e g , "a peg that stands out is pounded down," p 48) and identify strongly with their in-groups (e g , "achieve harmony in a network of supportive relationships," p 51) Another finding is that Westerners exhibit greater independence and favor the freedom of individual action, whereas East Asians are more interdependent and favor collective acceptance

When comparing how Westerners and East Asians perceive the world, in Chapter 4, Nisbett finds that Westerners perceive the world as a compilation of discrete objects and unconnected things This form of perception leads to an emphasis on individual actions as central to Westerners' managing of their environments East Asians are inclined to perceive the world as connected substances, with an emphasis on holistic integration Whereas Westerners focus on objects, East Asians are more inclined to focus on the context or the background of the object's environment

Nisbett's findings on causal attributions, which he addresses in Chapter 5, include that Westerners tend to attribute the causes of behavior to the actor or agent, and East Asians are more inclined to attribute the causes of behavior to context Thus, Westerners emphasize personality traits In contrast, East Asians are more likely to attribute behavior to situational factors

In Chapter 6, Nisbett poses the question, Why do Western infants learn nouns more rapidly than verbs, when it is the other way around in East Asia? With respect to organization of knowledge, many studies suggest that East Asians are less likely than Westerners to use categorical rules East Asians' preference for collective action is revealed by an emphasis on highly reactive verbs that connote relationships In contrast, Westerners, because of their fondness for categories, tend to learn nouns that are more inert and independent of context

Regarding the use of formal logic and reasoning, discussed in Chapter 7, Nisbett finds that East Asians are more likely to set aside logic in favor of the typicality and plausibility of conclusions Moreover, they are more likely to set logic aside in favor of the desirability of conclusions Contrariwise, Westerners are apt to arrive at conclusions by using logic that is less dependent on plausibility and desirability For this reason, East Asians are more likely to embrace contradictions, in contrast to Westerners' tendency to avoid them in their pursuit of principles to resolve them

If East Asians are measurably more holistic and if Westerners are more analytical, does it matter? In Chapter 8, Nisbett explores several areas in which it *does* seem to matter, such as medicine (the Chinese holistic, harmonious approach versus the Western proclivity toward analytic, object-oriented interventions), law (Western legal confrontation versus East Asian use of intermediaries), science (lack of confrontation and debate among Japanese scientists), rhetoric (Western linear method of refutation), contracts (Japanese view of changing context as a basis for renegotiation), international relations (Chinese consider causality ambiguous and the result of many factors), human rights (Chinese conception of rights is based on part–whole rather than Western one–many conception), religion (Western "right–wrong" mentality versus East Asian "both/and" orientation) Other areas in which different cognitive styles seem to matter include thinking per se, formal reasoning, training and testing, and intelligence tests

In the Epilogue, Nisbett discusses two familiar and opposing views of the future Francis Fukuyama's vision of convergence toward Western values and Samuel Huntington's disruptive vision of a "clash of civilizations " However, Nisbett proceeds to argue a third view a convergence based on the blending of Western and Eastern social systems and values Although Western traditions dominate, he adds (p 226) that "the entry of East Asians into the social science is going to transform how we think about human thought and behavior across the board " On an optimistic note, Nisbett concludes (p 229), "I believe the twain shall meet by virtue of each moving in the direction of the other"

It is easy to like this book because of its clarity and its engaging style Because it is also written in a journalistic style, devoid of academic jargon and footnotes, it is accessible to a large audience Even so, these strengths also constitute its weaknesses

Nisbett uncritically leans on Geert Hofstede's oft-cited work Although Hofstede's seminal work has advanced the study of cross-cultural differences, it has also been criticized by international business scholars for its methodological limitations Taken broadly, this casts a precautionary note on interpreting Nisbett's own sources and methods, which more often are citations of his work and those of his colleagues only in a confirmatory way, without the presentation of contrary evidence Although he appends a fairly comprehensive bibliography, it would have been informative (particularly for academicians) to include some data and statistical results of *selected* studies cited in the text

Moreover, it would have been helpful if Nisbett had defined fundamental cognitive abilities upfront instead of having descriptions distributed across different chapters For example, studies of intelligence depict different levels (1) ordinary cognition as including perception, sensation, and attention, (2) cognitive processes, such as representation, abstract reasoning, problem solving, and decision making, and (3) the etic manifestation of formal, learned, declarative versus experiential, procedural knowledge (see Earley and Ang 2003) Lacking such upfront distinctions, it is difficult to distinguish between inborn or early developed thinking processes from ones that are culturally acquired and enhanced This context is useful for scholars who might quibble with Nisbett's beginning premise that cognitive processes are invariant across cultures anyway In addition, for acceptance of Nisbett's core premise, a theory about *how* innate traits are transformed by enduring cultural influences would strengthen his core arguments The discussion of "homeostatic socio-cognitive systems" (pp 32–33) is a promising start, but it is not nearly enough to resolve the issue

Throughout the book, the reader is confronted with categorizations of Western versus East Asian thought processes After dwelling on the ecological reasons for this distinction in Chapter 1, there is a profound implication that the Western versus Eastern categorization might be, of itself, far too broad Despite Nisbett's references to particular cultures when discussing his experiments, a reader might be easily seduced into thinking in terms of the two broad, simplistic categorizations without thoughtfully examining the extensive differences *within* Western and East Asian cultures Anyone teaching in the various countries of Western Europe or East Asia will become quickly sensitized to significant differences in cognitive structure and worldview among Germans, Dutch, and Danes or among Japanese, Chinese, and Koreans Absent such discussion, it is easy to fall back on cultural stereotypes and risk overgeneralization

Although we agree with Nisbett's directions for biculturalism in training and testing, we believe that this could have been developed further It is true that more and more East Asians are attending Western academic institutions, but it is also true that the theories and concepts of business used and disseminated in those institutions are derived predominantly from Western traditions, beliefs, and scholarship A recent Harvard Business School survey corroborates this, reporting that approximately 80% of its instructional cases were out of date and that the relatively few international cases were ethnocentric in nature Scholars who have studied this concept argue that ethnocentrism is a limiting problem in training business students In view of significant ethnocentrism, which perhaps now occurs on both sides of the Pacific, the imperative for facilitating bicultural thinking is much more compelling

Nisbett's conclusion about East–West cultural convergence is intellectually soothing if not reassuring Among other things, however, it does not fully resolve the issue of how cognitive thinking might change as a result of cultural socialization Many Asians initially raised in their home countries have now received their education in the West, and could this have changed their thinking styles into more Western ones, and vice versa?

Our comments notwithstanding, we applaud Nisbett's book and wholeheartedly recommend it The book provides a nice foundation for marketing-related research, particularly in consumer behavior (as a perusal of Nisbett's reference list suggests) Among the many exciting developments discussed are Hong and colleagues' (2000) emerging studies of bicultural behavior that examine circumstances under which behaviors are evoked and used by people who are born in one country but are educated in another[2]

Geography of Thought contains many provocative arguments and useful insights that are bound to influence further research in cross-cultural and international marketing For example, advertisements focused on individual versus collective outcomes may affect East Asian and Western audiences differently Marketing messages and cues that are presented in isolation rather than embedded in social backgrounds may help reduce or enhance the rate of recall, depending on which audience is targeted Sports marketing promotions directed at celebrating the individual prowess and achievement of a stellar athlete might lead to misdirected results and unintended effects among East Asian audiences For those tasked with training future business professionals, the book serves an astute reminder that MBA training, with its emphasis on specialized functional disciplines and pedagogical discourse, can run counter to many East Asians' preference for holistic development and instructional methods that lead to collective harmony

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Lan Xia, Kent B. Monroe, & Jennifer L. Cox

The Price Is Unfair! A Conceptual Framework of Price Fairness Perceptions

Recent news coverage on pricing portrays the importance of price fairness This article conceptually integrates the theoretical foundations of fairness perceptions and summarizes empirical findings on price fairness The authors identify research issues and gaps in existing knowledge on buyers' perceptions of price fairness The article concludes with guidelines for managerial practice

The issue of price fairness has become newsworthy as concerns about gasoline prices, prescription drug prices, physicians' retainer fees, smart vending machines, hidden fees and charges, or Amazon com's dynamic pricing test have become public knowledge The uproar that occurred when an Amazon com customer discovered that the price of same-title DVDs differed across purchase occasions was a public relations nightmare for the firm (Adamy 2000) This example shows that both the price offered and the rationale for offering a certain price may lead to perceptions of price unfairness Perceptions of price unfairness may lead to negative consequences for the seller, including buyers leaving the exchange relationship, spreading negative information, or engaging in other behaviors that damage the seller (e g , Campbell 1999)

Why do consumers at times believe that they are being treated unfairly? Given increasing public concern, it seems appropriate to explore further the theoretical bases and empirical findings to clarify what is known about the causes of perceived price unfairness and how the perceptions influence customers' behaviors Various conceptualizations have been developed and adapted to explain the phenomenon of fairness However, each approach tends to address a specific reason for price fairness For example, the dual entitlement principle emphasizes the influence of supply and demand changes and the sellers' profit orientation (Kahneman, Knetsch, and Thaler 1986b) Equity theory and distributive justice emphasize the importance of equality of outcomes between two parties in an exchange (Adams 1965, Homans 1961) In contrast, procedural justice focuses on the influence of the underlying procedures used to determine the outcomes on fairness perceptions (Thibaut and Walker 1975) In this article, we present a conceptual framework for price fairness that integrates the conceptualizations and organizes existing price fairness research We then use the framework to identify gaps in existing research and to offer guidance for further research As we proceed, we develop a set of propositions for new research We conclude with some practical prescriptions for pricing managers

Perceived Price Fairness: The Conceptual Framework

Over the years, researchers have developed and adapted various theories to obtain an understanding of when and how buyers form price fairness judgments (see the Appendix) Figure 1 illustrates our conceptual framework, the rationale for which we develop next We begin by discussing the concept of price fairness Then, we discuss various factors that influence price fairness perceptions at the transaction level Finally, we discuss buyers' behavioral reactions to sellers when unfair price perceptions occur

The Concept of Price Fairness

Previously, fairness has been defined as a judgment of whether an outcome and/or the process to reach an outcome are reasonable, acceptable, or just (e g , Bolton, Warlop, and Alba 2003) The cognitive aspect of this definition indicates that price fairness judgments involve a comparison of a price or procedure with a pertinent standard, reference, or norm Nevertheless, to develop the conceptual meaning of fairness, we need to make several clarifications about this construct First, fairness and unfairness may be conceptually different constructs It is possible to be clear about one without having clarity about the other (Finkel 2001) Notions of unfairness are typically clearer, sharper, and more concrete than notions of fairness People know what is unfair when they see or experience it, but it is difficult to articulate what is fair

Second, all price evaluations, including fairness assessments, are comparative Both equity theory and the theory of distributive justice suggest that perceptions of fairness are induced when a person compares an outcome (e g , input and output ratio) with a comparative other's outcome

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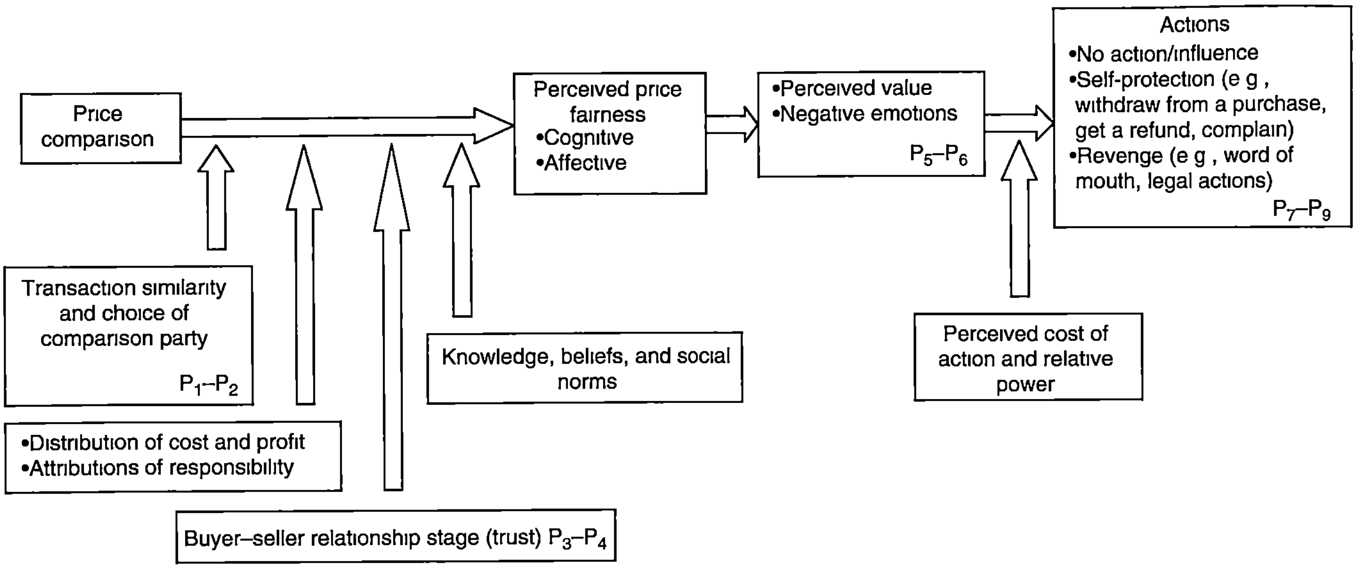
FIGURE 1
A Conceptual Framework of Price Fairness


Price comparison
Perceived price fairness
•Cognitive
•Affective
•Perceived value
•Negative emotions
P5–P6
Actions
•No action/influence
•Self-protection (e.g., withdraw from a purchase, get a refund, complain)
•Revenge (e.g., word of mouth, legal actions)
P7–P9
Transaction similarity and choice of comparison party
P1–P2
Knowledge, beliefs, and social norms
Perceived cost of action and relative power
•Distribution of cost and profit
•Attributions of responsibility
Buyer–seller relationship stage (trust) P3–P4

The principle of distributive justice maintains that people, in an exchange relationship with others, are entitled to receive a reward that is proportional to what they have invested in the relationship (Homans 1961). Equity theory broadens this perspective to include various comparative others that may influence the perceived fairness of an exchange relationship (Adams 1965). A reference other may be "another person, a class of people, an organization, or the individual himself relative to his experiences from an earlier point in time" (Jacoby 1976, p. 1053). Indeed, social comparison processes are central to most theories of justice and outcome satisfaction (Major and Testa 1989). In the context of price fairness, the outcomes to be compared are prices. When the price being judged differs from the price in the reference transaction, the price difference may induce an unfairness perception. Such a price comparison is a necessary but not sufficient condition for price unfairness perceptions to occur.

It should be noted that price comparisons can be explicit as well as implicit. In explicit comparisons, people compare one price with another price or with a range of prices. For example, a consumer may claim, "I paid more than another customer did," which is a comparison between two price points, or "I paid more than I used to," which is a comparison between a price point and a price range. However, the comparison may not necessarily be explicitly stated. For example, senior citizens may claim that a price is unfair. Although this judgment seems to be based on a single price, it nevertheless is an implicit comparison to an unspecified but expected lower price that they believe they are entitled to because of their limited fixed income.

Price comparisons lead consumers to one of three types of judgments: equality, advantaged inequality, or disadvantaged inequality. A perception of price equality normally does not trigger a fairness perception, or if one is triggered, it may lead to perceived fairness. A perception of price inequality may lead to a judgment either that the price is less fair than the equal prices situation or that it is unfair.

Third, a price fairness judgment is subjective and usually is studied from the buyer's perspective. Therefore, the judgment tends to be biased by the buyer's self-interest, that is, the buyer tries to maximize his or her own outcome (i.e., tries to pay a lower price) compared with that of the other party (Oliver and Swan 1989a). Thus, the judgment and feelings associated with advantaged and disadvantaged price inequality are different. Consequently, perceived unfairness is less severe when the inequality is to the buyer's advantage than when it is to the buyer's disadvantage. That is, for an equivalent magnitude of price inequality, we expect to observe a smaller degree of perceived unfairness when the inequality is to the buyer's advantage than when it is to the buyer's disadvantage (Ordóñez, Connolly, and Coughlan 2000). Indeed, Martins (1995) finds that the perceived fairness effect of a comparable other buyer paying less is stronger than when the comparable other pays more.

Fourth, previous research has concentrated on the cognitive aspect of unfairness perceptions. We propose that affect is an important element that accompanies the cognition of price equality or inequality. A buyer may have feelings of unease or guilt when the inequality is to his or her advantage but feelings of anger or outrage when the inequality is to his or her disadvantage. These emotions may occur concurrently with the unfair cognitions, or arguably they may even precede such cognitions (Campbell 2004). Severe unfairness perceptions "typically come with heat and passion, anger, and outrage, and they insistently press for action or redress" (Finkel 2001, p. 57). This strong negative emotion is an element that distinguishes unfairness either from fairness or from less fairness. In this article, we add affect as an important element of price fairness perceptions.

Fifth, an unfairness perception and potential negative emotions usually are directed toward the party that is perceived as having caused the "unfair" situation For price unfairness, the target of the perception and the emotions is usually the seller Thus, the actions that buyers take when they perceive that prices are unfair are usually directed toward the seller rather than toward a comparative other buyer or the product involved in the transaction Finally, fairness is different from satisfaction, though research has shown that the two concepts are highly correlated and are sometimes used interchangeably (Ordóñez, Connolly, and Couglan 2000) In this article, we define price fairness as a consumer's assessment and associated emotions of whether the difference (or lack of difference) between a seller's price and the price of a comparative other party is reasonable, acceptable, or justifiable

Factors That Influence Unfairness Price Perceptions

Various factors may influence unfairness price perceptions In this section, we summarize the potential factors into four groups The factors vary in terms of relevancy and immediacy to a specific comparative transaction The first group of factors includes the variables that specify the context of the comparative transactions We have indicated that price comparisons, whether explicit or implicit, are a necessary but not sufficient condition for price fairness perceptions to occur Although both distributive justice and equity theory use buyer and seller input and output ratios as comparatives, consumers usually do not know either the seller's cost structure or other pertinent information to determine the seller's input accurately (Bolton, Warlop, and Alba 2003) Thus, a price fairness judgment most likely is based on comparative transactions that involve different parties When perceived price discrepancies occur, the degree of similarity between the transactions is an important element of price fairness judgments Moreover, a fairness judgment also depends on the comparative parties involved in the transactions

Second, in addition to information that establishes the relevant context for price fairness judgments, procedure justice theory, equity theory, and the principle of dual entitlement all indicate that information that provides reasons why a certain price is set may influence perceptions of price fairness Previous research has shown that such information may include procedures or processes that lead to the observed prices For example, a price increase may be caused by an increase in costs In addition, the type of cost and whether sellers have control over the costs may influence the degree of perceived unfairness Third, consumers may consider more than a particular transaction and make inferences based on their previous experiences For example, a consumer who has had a good experience with a seller during repeated transactions may assume that a price increase occurs for legitimate reasons when the reason for the price increase is actually unknown Fourth, consumers may also rely on their general knowledge or beliefs about sellers' practices to adjust their judgments of price fairness

These four groups of influencing factors vary in their relative scope Transaction similarity and choice of comparative party set an immediate context for the comparative transactions Cost–profit distributions and consumer attributions are specific to a transaction (i e , reasons for a specific price) Then, such a transaction can be considered in a broader context of buyer–seller relationships that are based on repeated transactions Trust is the major concept in buyer–seller relationships, and we propose that it influences fairness perceptions Finally, we place price fairness judgments in a still broader social context and suggest that social norms and consumers' metaknowledge of the marketplace also influence price fairness judgments Most previous research has concentrated on cost–profit distributions or attributions, and we summarize previous research in that area We further offer new propositions in the other areas

Transaction similarity and choice of comparative other parties Although social comparison research has focused on the similarity between comparative parties (Major 1994), we extend the concept to include all aspects of the two transactions An economic transaction involves the exchange of a given product at a certain location for an agreed-on amount of money with specified terms between at least two parties That is, transactions may vary in several ways Transactions may occur at different times Products may be the same type but with different brand names or with the same brand name but different models The same product may be sold in a department store rather than a discount store or in two different department stores Different terms might accompany the transactions, such as a seller's price promotion or a buyer's coupon redemption Finally, characteristics of the parties involved also contribute to the degree of similarity between the two transactions When another customer is the other party involved in the comparison, a person similar in age to the buyer is more comparable than a person who belongs to a different age group (e g , child, student, senior citizen), which might be entitled to different prices (Martins 1995) Such characteristics are an integral part of the comparison, and differences in the characteristics decrease transaction similarity

Social comparison research has reported a similarity bias, demonstrating that people tend to pay attention to the similarity between the two parties or entities being compared Observable similarities between the two comparison entities induce people to access information that supports the similarities selectively, which leads to an assimilation effect (Mussweiler 2003) Such an assimilation effect with respect to the involved comparative parties enhances the saliency of the outcome differences that lead to a strong feeling of entitlement (Major 1994, Major and Testa 1989) However, when the dissimilarity between the two entities is obvious, people selectively access information that supports the dissimilarities, which leads to a contrast effect (Mussweiler 2003) Such a contrast effect leads to judgments that the comparative transactions or parties are not similar, which offers a natural explanation for the perceived price differences

Although this similarity bias has been discovered in person-to-person comparisons, we argue that the same principle applies to comparisons between two transactions For price comparisons, when the degree of similarity between the comparative transactions is relatively high, buyers have little differential information to explain a price discrepancy

Thus, the assimilation effect leads consumers to expect or believe that they are entitled to equal prices, and they are likely to judge the price discrepancy as unfair However, when the degree of similarity between the transactions is low, the contrast between the two transactions explains the price difference As a result, consumers will judge the price discrepancy as fair or less unfair Indeed, a fairness judgment may not even occur if consumers consider the two transactions incomparable

> P_1 Given a perceived price discrepancy between two transactions, a high degree of transaction similarity leads to a high perception of price unfairness

Many aspects of a transaction influence the similarity between two transactions and consumers' consequent price fairness perceptions Whether and how one element (e g , product differences) has a greater effect than another element (e g , store differences) is an empirical issue that needs research It has been shown that observable product differences naturally lead to quality inferences and cost attributions (Bolton, Warlop, and Alba 2003) Such inferences are likely to decrease the degree of similarity Because the product or service is the focus of a transaction and has a direct effect on consumers' perceived value, we expect that product differences have the greatest effect on the degree of similarity and thus on price fairness perceptions

In an application of equity theory to price comparisons, there are three types of comparative reference parties that consumers may use self, other customers, or different organizations (e g , stores) Indeed, each type of references has been shown to influence price fairness perceptions (Bolton, Warlop, and Alba 2003) Here, we single out the difference between self/self and self/other-customer comparisons and suggest that price fairness judgments also depend on the source of comparison as well as transaction similarity Although self is more similar to the individual customer than is another customer, a self/self comparison may not necessarily have a greater effect on price fairness judgments than a comparison with another customer Therefore, we focus on the relative effects of a self-comparison compared with those of other-customer comparison on perceptions of price fairness Which reference has a greater effect on price fairness perceptions? If multiple references are available, how do customers choose one reference over another, or what is the combined effect?

Social comparison theory has identified "similar others" as the most important comparison target because of its salience (Major 1994, Wood 1989) When people estimate their own entitlement, they are most likely to choose others who are similar to themselves as the comparative other party (Wood 1989) Only when external comparison others are unavailable or not salient in the environment, or when people regard them as too dissimilar, will they make estimates of entitlement on the basis of intrapersonal (self/self) comparisons (Major 1994) In addition, comparisons with others produce a greater effect on feelings of entitlement than do self-comparisons Research shows that social comparisons (i e , comparisons with others) explain more variance in satisfaction than do people's individual expected outcomes (Major and Testa 1989) Moreover, only social comparisons have a significant relationship with fairness judgments (Austin, McGinn, and Susmilch 1980)

For price comparisons, we propose that given the same transaction characteristics, the other-customer comparison has the greatest effect on perceived price unfairness because of the salience of such a comparison (Major and Testa 1989) Our early research shows that given a price discrepancy, a comparison with a similar other customer leads to higher unfair perceptions Moreover, when there is no price discrepancy, a comparison with a similar other customer leads to higher fair perceptions than does the self/self comparison (Xia and Monroe 2004)

However, similar others are not always available as comparative references, and self/self comparisons are also common In self/self comparisons, people typically believe that they deserve the same treatment or outcomes that they have previously received Overall, the choice of a comparative other party depends on both immediate availability and salience (Major 1994)

> P_2 Given a perceived price discrepancy and two transactions with similar characteristics, the other- (similar) customer comparison, when available, has a greater effect on price unfairness judgments than does the buyer's self-reference

Furthermore, little research has examined the effect of multiple comparative parties Ordóñez, Connolly, and Coughlan (2000) examine the effect of multiple external references and suggest that instead of integrating all the references, people tend to compare with each reference independently Consistent with prospect theory, Ordóñez, Connolly, and Coughlan find that the pain of a disadvantaged inequality relative to one reference is greater than the pleasure of an advantaged inequality relative to another reference Thus, we suggest that when both self and other customers are available as references, the reference that produces a disadvantaged inequality for the buyer has a greater impact as a result of the "loss-looms-larger" effect However, when the two references both are advantaged or disadvantaged, the similar other-customer comparative reference has a greater effect on price unfairness perceptions than do consumers' self-comparisons

The cost–profit distribution and attributions for the inequality A perception that a price is unfair results not only from a perceived higher price but also from consumers' understanding of why the higher price was set The seller's cost plays an important role in buyers' assessing of whether a price or a price increase is acceptable or fair (Bolton, Warlop, and Alba 2003) When buyers believe that sellers have increased prices to take advantage of an increase in demand or a scarcity of supply, without a corresponding increase in costs, they will perceive the new higher prices as unfair (Frey and Pommerehne 1993, Kahneman, Knetsch, and Thaler 1986a, b, Urbany, Madden, and Dickson 1989) However, an unavoidable increase in a firm's costs may make the price increase acceptable (Kahneman, Knetsch, and Thaler 1986a) Buyers will perceive a disadvantaged price inequality as more unfair if they perceive that the seller profits from the buyer's loss For example, consumers consider a price increase for snow shovels the morning after a snowstorm unfair, but they consider an increase in grocery prices after an equivalent increase in wholesale prices not unfair (Frey and Pommerehne 1993, Kahneman, Knetsch, and Thaler 1986b)

Making the seller's costs salient reduces people's estimate of a firm's profit margin, thereby decreasing their perceptions of price unfairness (Bolton, Warlop, and Alba 2003) However, not all costs are equally legitimate (Bolton, Warlop, and Alba 2003) Price increases that result from managerially influenced cost increases are perceived as less fair than are externally caused cost increases (Vaidyanathan and Aggarwal 2003) Therefore, in addition to considering the seller's cost–price (profits) relationship, consumers may make *attributions* as to who is responsible for such an outcome, especially when there is no clear information on the seller's actual costs and profits

Although attribution theory is not a theory of fairness per se, it provides a basis for how people rationalize an ambiguous situation (Weiner 1985) When it is ambiguous as to why an unexpected price occurred and who is responsible for it, an explanation provides people with feelings of control over their environment and serves as an adaptive function (Folkes 1990) In general, people are less motivated to seek attributions when they perceive the inequality as to their advantage than when they perceive it as to their disadvantage (Weiner 1985)

As we discussed previously, a perception of price unfairness, especially the emotional aspect of it, typically is targeted toward the seller Therefore, buyers seek information to determine whether the seller is responsible for the situation of inequality It has been shown that consumers respond more unfavorably if a perceived price inequality is due to a firm's volitional intentions or actions (internal locus of causality and controllability) (Bolton, Warlop, and Alba 2003, Vaidyanathan and Aggarwal 2003) Thus, we argue that when buyers seek attributions to determine whether the seller is responsible for the price inequality, they are strict with the seller out of their self-interest That is, the seller is responsible for the perceived inequitable price unless there is evidence that shows otherwise Therefore, if buyers perceive the seller as having control over the situation, or if the cause of the price differential is internal to the seller, then the seller is responsible However, buyers may accept a firm's goodwill motive even when the higher price is not due to cost-related factors and is controlled by the company (Campbell 1999)

Buyer–seller relationship and trust Moving beyond transaction-specific information of cost–profit distributions and attributions, we now examine whether a buyer–seller relationship that is built on repeated transactions over time influences fairness perceptions A construct that is important for understanding the status of a buyer–seller relationship is trust (Morgan and Hunt 1994, Sirdeshmukh, Singh, and Sabol 2002) Trust is a multidimensional construct, defined as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Davis, and Schoorman 1995, p 712) Trust can be conceptualized as consisting of three dimensions ability (i e , skills and competencies of the trustee), benevolence (i e , the extent to which a trustee is believed to want to do good to the truster), and integrity (i e , the truster's perception that the trustee is honest and fulfills its promises) (Mayer, Davis, and Schoorman 1995) These dimensions are closely related and are necessary for the formation of overall trust

We suggest that buyers' perceptions of price fairness are influenced by different dimensions of trust associated with the relationship In the context of buyer–seller relationships, it is possible that buyers emphasize different dimensions of trust at different relationship stages Lewicki and Bunker (1995) suggest that at an early stage of a buyer–seller relationship, the two parties are regulated by the potential benefits of their promises and/or by the costs of cheating (i e , calculus-based trust) Over repeated interactions, the relationship develops, and the two parties begin to know each other (i e , knowledge-based trust) At this stage, predictability is key to the relationship, and each party anticipates the actions of the other party When the relationship is fully developed, trust is based on a full internalization of the other party's desires and intentions (i e , identification-based trust) At this stage, the two parties "effectively understand, agree with, and endorse each other's wants" (Lewicki and Bunker 1995, p 151) A party can be confident that its interests are fully protected by the other party We propose that trust has a different meaning (i e , emphasis on different dimensions) at different stages of a buyer–seller relationship Thus, the nature of the influence of trust on price fairness perceptions may depend on the specific stage of a buyer–seller relationship

On initial contact with the seller, buyers have no previous transaction experience with the seller As a result, they may base their trust on the seller's reputation and contextual cues, such as store display and product assortment, or the seller's publicized goodwill to assess the cost–benefit of transacting with this seller (i e , calculus-based) The initial trust may not necessarily be low because a buyer may choose to trust a seller until something goes wrong (McKnight, Cummings, and Chervany 1998) At this initial stage of the relationship, the important dimension of trust may be competence, because buyers may be more concerned about various aspects of a transaction, such as product quality, delivery, and return policy For example, the seller's reputation may serve as a cue for the buyer to form initial trust A good reputation signals competence of the seller or the seller's goodwill and serves as a buffer to buyers' potential negative attributions for a price discrepancy (Campbell 1999) A seller's good reputation may make an equal or advantaged unequal price situation seem more fair and decrease buyers' price unfairness perceptions when a disadvantaged price inequality occurs

As repeated transactions between buyers and the seller occur, buyers gain more information about the seller's trustworthiness Previous transaction experiences play an important role in determining trust Thus, trust becomes more "interpersonal" and is more knowledge-based Moreover, buyers begin to consider themselves loyal customers, and the relationship becomes an important basis for continued transactions with the seller. At this stage, the buyer knows the competence of the seller, so there is more emphasis on the benevolence dimension than on the competence dimension. The buyer is more likely to take the seller's actions "personally." Thus, for customers who believe that they have a close relationship with the seller, when the price is as expected or lower, they may perceive it as a benefit of the relationship. However, when loyal buyers pay a price that is higher than their comparative standard, they may judge the seller as having betrayed their good relationship (Sirdeshmukh, Singh, and Sabol 2002), leading to a more unfair price perception. To illustrate, Huppertz, Arenson, and Evans (1978) find that when perceived price and service inequity are high, buyers judge the situation as less fair when they have a close and frequent exchange relationship with the seller than when the exchanges are infrequent. In the context of online dynamic pricing, Garbarino and Lee (2003) find that a comparatively higher price decreases the benevolence dimension of trust but has no significant effect on the competence dimension.

Finally, when buyers and sellers enjoy a close relationship that is truly based on identification, they share each other's values, desires, and intentions. In this case, level of trust may be high on all dimensions, and "faith" is an important element in such a relationship (Rempel, Holmes, and Zanna 1985). Because of the strong attachment between the two parties, the relationship may sustain rather strong challenges (Lewicki and Bunker 1995). Therefore, the buyer's overall trust in the seller serves as a buffer to decrease the negative effect of a comparatively disadvantaged price on price unfairness perceptions. However, most business relationships remain at the calculus- or knowledge-based level without developing into an identification-based relationship (Lewicki and Bunker 1995). In summary, the influence of trust on price fairness perceptions depends on the direction of the inequality and the nature of the trust, which varies depending on the stages of the buyer–seller relationship.

P_3: When the comparative outcome is positive or neutral (i.e., advantaged inequitable or equitable prices), trust in the seller has a positive effect on price fairness perceptions.

P_4: When the comparative outcome is negative (i.e., disadvantaged inequitable price), trust in the seller has a U-shaped effect on price fairness perceptions.

Social norms and metaknowledge of the marketplace. Beyond the buyer–seller relationship, consumers may draw on their general knowledge about the marketplace. As Bolton, Warlop, and Alba (2003) suggest, buyers may judge fairness at an aggregate level across a transaction space that consists of multiple dimensions. In addition, buyers' perceptions of price fairness stem both from economic comparisons and from social norm comparisons. Social norms of economic exchange are the understood rules of behavior for both buyers and sellers, and they serve as guides to behaviors of parties in exchanges (Maxwell 1999). Maxwell (1995) demonstrates that, indeed, many price fairness judgments stem from buyers' considerations of how the seller determines price and whether the price is affordable to everyone, particularly in reference to necessities such as pharmaceuticals. Therefore, consumers may also rely on their beliefs about the exchange norms to refine their price fairness judgments.

In addition, because information is more readily available in publications such as *Consumer Reports* and consumers are able to gain more information from their buying experiences, they develop knowledge of marketers' pricing tactics and of the relative cost–profit composition of a product's price. This metaknowledge, whether accurate or not, guides consumers' fairness judgments (Bolton, Warlop, and Alba 2003). However, the beliefs and metaknowledge may evolve over time (Wright 2002). A norm develops when many people engage in the same behavior regardless of the reason for the initial action (Opp 1982). Similarly, as the dual entitlement principle suggests, stability is the norm. A practice that is initially perceived as unfair may slowly spread and evolve into a new norm that is accepted by most people and is less likely to be perceived as unfair (Kahneman, Knetsch, and Thaler 1986b). For example, as the airlines' practice of dynamic pricing with yield management technology becomes accepted by most consumers, the practice is more likely to be perceived as fair (Kimes 1994). Therefore, perceived unfairness of a price or procedure may decline over time (Kachelmeier, Limberg, and Schadewald 1991). Overall, when and how social norms and consumers' general knowledge influence price fairness should be investigated in further research.

Effects of Buyers' Unfairness Perceptions

Previous research has shown that unfair price perceptions influence customer satisfaction, purchase intentions, and complaints (Campbell 1999; Huppertz, Arenson, and Evans 1978; Martins 1995). We suggest that price fairness perceptions influence assessments of product value and customer satisfaction. In addition, the perceptions generate negative discrete emotions that may vary in intensity and type. These value assessments and negative emotions are mediating variables that influence different behavioral actions, including purchase intentions, complaints, and negative word-of-mouth communications.

Perceived value. An important mediating variable of buyers' purchase intentions is their perceptions of the value of the seller's offering. Buyers' perceptions of value are mental trade-offs of what they believe they gain from a purchase with what they sacrifice by paying the price (Monroe 2003). Research has shown that buyers believe that a perceived unfair price represents a lower value than a financially equivalent fair price (Martins and Monroe 1994). Assuming that there is no perceived difference in quality or benefits received from the product or service, this reduction in perceived value must result from an increase in perceptions of monetary sacrifice (Monroe 2003). Similarly, Sinha and Batra (1999) find that perceived price unfairness increases buyers' price consciousness. Because price-conscious buyers tend to focus on the monetary sacrifice of a price, higher perceived price unfairness increases perceptions of monetary sacrifice. However, it should be recognized that the same asymmetry between advantaged and disadvantaged inequality exists here. Although a disadvantaged price inequality may lower the perceived value of an offer, an advantaged inequality may have no effect or may even decrease perceptions of monetary sacrifice (Martins 1995)

> P$_5$ A perceived disadvantaged price inequality increases perceptions of monetary sacrifice, thereby lowering perceived value of an offer compared with situations of equal prices or advantaged price inequality

Negative emotions Research shows that unfair price perceptions lead to dissatisfaction (Oliver and Swan 1989a, b) Dissatisfaction is a negative experience that is correlated with anger (Folkes, Koletsky, and Graham 1987, Storm and Storm 1987) Research also suggests that specific emotions that arise from purchase situations may be more relevant to buyers' complaint behaviors, word-of-mouth communication, switching, and repurchase than are satisfaction or dissatisfaction (Bagozzi, Gopinath, and Nyer 1999) Thus, to examine the affect dimension of price unfairness perceptions, we use a discrete emotions approach rather than dissatisfaction, and we suggest that perceived price unfairness is accompanied by various negative emotions

An advantaged inequality may lead to feelings of uneasiness or guilt, whereas a disadvantaged inequality may induce disappointment, anger, or outrage (Austin, McGinn, and Susmilch 1980) We suggest that similar feelings occur in the context of price fairness Emotions that accompany unfairness perceptions may vary in intensity as well as type Although some emotions, such as uneasiness, may not lead to specific actions, some strong negative emotions, such as anger, may require a person to use coping mechanisms (Bougie, Pieters, and Zeelenberg 2003)

> P$_6$ An advantaged price inequality is associated with feelings of uneasiness or guilt, whereas a disadvantaged price inequality is associated with feelings of disappointment or anger

These emotions may occur concurrently with or after the cognition of a price inequality, which leads to immediate reactions, or they may occur (or be modified) during value assessments, which lead to more deliberate actions Aiming to reinstate a price equality condition and coping with the psychological discomfort of perceived unfairness, buyers may initiate actions to compensate themselves for the monetary sacrifices and/or to "vent" their emotions in ways that help them return to a normal emotional state In the next section, we discuss buyers' reactions when perceived price unfairness occurs Because the target of buyers' perceptions and emotions is the seller, buyers' reactions have consequences for the seller

Buyers' Behavioral Reactions

Early price fairness research was motivated by the belief that perceived price unfairness constrains firms' attempts to maximize profitability (Kahneman, Knetsch, and Thaler 1986b) That is, buyers react in ways that produce negative consequences for firms, including lower purchase intentions, complaints, and negative word of mouth (Campbell 1999, Huppertz, Arenson, and Evans 1978, Martins 1995) We believe that when perceptions of unfair prices occur, buyers act to address the two elements of the outcome of their assessments Therefore, an objective of buyers is to protect themselves financially and to seek monetary compensation Another objective is to cope with the negative emotions that may have occurred A perceived large price inequality motivates consumers to seek monetary compensation In addition, the different types of emotions that arise with perceptions of unfairness induce different actions (Bougie, Pieters, and Zeelenberg 2003, Raghunathan and Pham 1999, Zeelenberg and Pieters 2004) Such responses to perceived unfairness may be viewed as coping mechanisms to restore the desired equitable situation both financially and psychologically We now outline a set of actions that buyers may take when they perceive prices as fair or unfair Some actions are taken mainly to address the financial issue, whereas others address the psychological issue

It is not costless when buyers take actions to cope with a perceived inequitable situation If they decide to leave the relationship, they may incur switching costs that include time, effort, and even money (Urbany, Madden, and Dickson 1989) In addition, when considering the actions to take, buyers may also estimate their relative power and the likelihood that they will succeed in executing the potential actions Thus, the cost of action and relative powers between the buyer and seller moderate buyers' potential actions when they face a perceived unfair situation

No action In a "no-action" situation, perceived unfairness has no significant influence on buyers' planned transactions with the seller When buyers are advantaged, the situation does not lead either to lower perceptions of value or to strong negative emotions, though buyers may have feelings of unease or guilt Research has shown that feelings of guilt may promote a desire to "redistribute" or a "giving" behavior (Walster, Walster, and Berscheid 1978) For example, in the context of price (un)fairness, the target for the potential giving activity, if there is any, may be a charity rather than the seller, because the seller is not the disadvantaged party that suffers Because the giving action is directed outside the buyer–seller transactions, feelings of guilt lead to no particular action in the buyer–seller relationship

When buyers are slightly disadvantaged, there may be some decrease in perceived value and feelings of disappointment If so, buyers either are not motivated to take action or believe it is not worthwhile to take action because of the cost of complaining or switching to another seller (Urbany, Madden, and Dickson 1989) However, although consumers may take no action to change the current or future transaction relationships with the seller, they may still spread negative word of mouth to vent their discomfort or disappointment with the seller (Zeelenberg and Pieters 2004)

Self-protection When buyers believe that an inequality in an exchange is unacceptable and are upset, disappointed, or regretful (if they believe that there is a better option), they may choose to complain, ask for a refund, spread negative word of mouth, and/or leave the relationship, depending on their assessment of which action is most likely to restore equity with the least cost In addition, they may search for additional information to assess the potential switching costs or to assess their power to renegotiate with the seller For example, Bougie, Pieters, and Zeelenberg (2003) find that the experience of dissatisfaction usually evokes thoughts about what buyers missed out on and the need to search for more information to find out who or what is responsible for the event In terms of actions, buyers tend to make a deliberate judgment about how to act, or they try to devote attention to something else Therefore, when consumers perceive a price as less fair, they may choose actions to enhance their own benefits and to reduce their perceived monetary sacrifice When the actions are less obtainable or too costly, they may choose to leave the relationship (Huppertz, Arenson, and Evans 1978) The objective of these actions is essentially for consumers to protect themselves from being taken advantage of in the future At the same time, spreading negative word of mouth is a low-cost action that helps buyers cope with their negative feelings of disappointment or regret and prevents other customers in their social network from being exploited

Revenge When a strong negative emotion, such as anger or outrage, occurs with a perception of price unfairness, customers' leaving the relationship or complaining may not be sufficient to address the perceived inequity The feeling of anger, which is a distinct emotion from dissatisfaction or disappointment (Bougie, Pieters, and Zeelenberg 2003), typically is associated with perceived unfairness and leads to a tendency toward aggressive behavior Anger evokes immediate actions with no deliberation of how to act Studying consumers' reactions to product failures, Folkes (1990) suggests that anger mediates the relationship between the attributions regarding the seller's responsibility and the desire to engage in conflict with the seller Thus, to cope with anger or outrage, customers may seek revenge Angry customers want to "get back" at the organizations (Bougie, Pieters, and Zeelenberg 2003) Such actions can even occur at the customer's expense, rather than compensating them for their perceived loss It has been demonstrated that customers seek revenge for a company's wrongdoing by switching to the company's direct competitor, even when switching is a less-than-optimal choice (Bechwati and Morrin 2003) Although the choice itself seems to be irrational, the psychological benefit of switching helps customers cope with the situation In addition, when customers become more angry, they are more likely to complain and engage in negative word of mouth and less likely to repatronize the seller (Folkes, Koletsky, and Graham 1987) Although negative word of mouth in no action and self-protection is a mechanism for customers to comfort themselves psychologically, negative word of mouth driven by anger transcends customers' social network and has the objective of damaging the seller Therefore, additional actions such as reports to the media or legal and regulatory agencies are possible In summary, we argue that the severity of the perceived inequality and the differences in emotions experienced further induce different actions that customers may take, the objectives of these actions, and the degree of damage inflicted on the seller

P_7 When buyers perceive a price as less fair as a result of an advantaged inequality, they take no particular actions to change the transactions or relationships with the seller

P_8 When buyers perceive a price as less fair as a result of a disadvantaged inequality, the value for money is the major driver of their actions They evaluate the costs of action and inaction and are likely to respond to the situation by either no action or actions that seek mainly monetary compensation

P_9 When buyers perceive a price as unfair, negative emotions are the major driver of their actions They are more likely to cope with the negative emotion by spreading negative word of mouth or even by seeking revenge with the goal of harming the seller to "get even" psychologically

Overall, we have examined the various influencers and consequences of price fairness perceptions Our framework is not completely inclusive, we consider price fairness in a buyer–seller transaction context and examine it from the buyer's perspective This perspective does not mean that price fairness cannot be studied from the seller's or third party's perspective or at the group or organizational level In addition, factors such as buyers' individual characteristics may influence whether customers evoke perceptions of price unfairness under certain circumstances and how they may react to those perceptions

Implications for Pricing Managers

The importance of price unfairness perceptions and their impact on firms' profitability has long been recognized (Kahneman, Knetsch, and Thaler 1986a, b) Although buyers' perceptions of price unfairness are based on perceived price differences, a goal of fair pricing does not mean a one-price policy for everyone, nor does it mean that customers do not accept price changes or price differences Indeed, a survey of retail businesses found 12 different customer groups to which price discounts can be offered (Martins 1995) A key question is how to make price differences more acceptable and less likely to evoke unfairness perceptions We now offer some guidelines for achieving and maintaining perceived fair prices in the context of differential pricing

Decrease Transaction Similarity

As we conceptualize, when customers perceive two transactions as similar, the effect of observed price differences on perceptions of price unfairness is greater than for other situations Therefore, perceptions of price unfairness can be mitigated by a decrease in the similarity of the transactions The practice of yield management sets different prices for seemingly similar products or services, such as a hotel room or an airplane seat, but additional benefits or restrictions are attached to each offer, which makes the products or services less comparable These restrictions decrease the similarity of the transactions and the attention that customers place on perceived price differences, thereby reducing the likelihood of price unfairness perceptions Contrary to this principle, Amazon com charged the same customer a higher price for the same product on the basis of his purchasing history There was no differentiation between the products or service in the two transactions As a result, Amazon com received negative customer and media response when the practice was discovered (Adamy 2000)

We suggest that product differentiation is a dominant factor in decreasing transaction similarity Consumers infer quality differences when products differ, which helps them attribute the price differences to sellers' cost, thereby reducing perceptions of price unfairness (Bolton, Warlop, and Alba 2003) Therefore, product customization and differentiation help decrease transaction similarity and the likelihood of price unfairness perceptions Information technology offers firms opportunities to customize their price and products Price differentiation without corresponding product customization may evoke price unfairness perceptions among consumers

Anticipate Reactions to Price Differences and Provide Relevant Information

Our review indicates that additional information is helpful for buyers to sort out whether the seller is responsible for the price differences and whether the seller benefits from such differences Anticipating that buyers will find price discrepancies based on the sellers' pricing strategies and tactics, marketers should proactively provide relevant information to influence buyers' attributions for the price discrepancies

When buyers are uncertain about product quality, price, and the seller's costs in an exchange relationship, sellers can communicate their costs or inputs to the exchange relationship in several ways Buyers perceive cost-based pricing rules as fairer than market-based ones (Maxwell 1999), however, consumers have little knowledge of a seller's actual costs and profit margins (Bolton, Warlop, and Alba 2003) Therefore, sellers' making the relevant cost and quality information transparent helps Considerable amounts of such information are available on various Web sites For example, marketing communications campaigns that explain the firm's commitment to using top-of-the-line raw materials for its products signal to consumers that the seller's quality and costs are relatively high (Kirmani and Rao 2000)

In addition, although sellers may be unwilling to make their cost structures and margins known to customers, they can switch buyers' attention away from prices to focus on the value that they provide For example, sellers' emphasis on flexible travel dates, the ability to seek a refund, and friendly cancellation policies communicate the relative value of a comparatively higher airfare Furthermore, such benefits help reduce the tension of a comparatively higher price when the buyers value the benefits Buyers are more likely to seek information when price discrepancies occur Thus, sellers' offering relevant information in advance may decrease the likelihood of severe perceptions of price unfairness (Collie, Bradley, and Sparks 2002)

Manage Customer Relationships

We have conceptualized price fairness in the context of buyer–seller transactions, and we have argued that trust is an important factor that influences perceptions of price fairness As we argue, trust may have different meanings in different stages of the buyer–seller relationship First, a seller's building of a good reputation may help build initial trust and attract new customers, and this trust may serve as a buffer that helps decrease negative attributions when price discrepancies occur For example, as demand increases for products such as building materials after the occurrence of a natural disaster, local retailers often maintain prices for necessity items (Haddock and McChesney 1994) Second, repeat transactions with a seller help build benevolence trust Therefore, loyal customers focus more on whether sellers care about them When customers perceive an unfair price, they are likely to perceive it as exploitation and are more likely to punish the seller To show appreciation to loyal customers, sellers offer various reward mechanisms, such as loyalty programs Finally, the benefit to sellers of continuously building such good relationships is higher overall trust, which can survive a strong challenge Although it is important for marketers to attract new customers while maintaining existing profitable customers, we recommend that marketers focus on different needs in trust building and use different communication programs or offer differentiated products to different segments to minimize potential unfavorable price comparisons across groups of customers

Damage Control When Perceptions of Unfairness Arise

It is important not only to prevent unfair price perceptions but also to control the damage when perceptions of unfairness occur Our framework suggests that buyers believe that they have made monetary sacrifices and/or have negative emotions when they perceive a price as unfair Although increased perceived monetary sacrifice induces switching or complaint behaviors, the effect of negative emotions due to price unfairness perceptions has not been studied We argue that negative emotions accompany a perceived unfair price and that buyers use different repair mechanisms to cope with the increased perceived monetary sacrifice and their negative emotions

When buyers' major concern is the actual price difference, the seller may control the potential damage by offering a refund, an additional reward (monetary or gift), or another form of compensation However, when unfairness perceptions are accompanied with strong negative emotions, financial compensation may not be sufficient The seller needs to offer a venue that allows buyers to "vent" their negative emotions Negative word of mouth is a common behavior that consumers use to release their disappointment with a transaction Instead of having consumers spread such negative word of mouth to their social network or beyond, marketers can set up a forum, such as an online discussion board monitored by the firm, to redirect such feelings and to give the firm an opportunity to explain and offer compensation

In addition, the interaction between the buyers and the seller's representatives is the key to managing angry customers The desire for vengeance after a dissatisfying experience is influenced by how well consumers are treated during the redress process (Bechwati and Morrin 2003) When treated appropriately (e g , politely, respectfully), buyers may reinstate their normal emotional state (Bowman and Narayandas 2001, Smith, Bolton, and Wagner 1999) Although buyers may still choose to leave the relationship, they may be less likely to seek revenge, an action that is most damaging to the seller Thus, sellers need to reach their customers proactively when severe unfair price perceptions arise and to minimize the damages by redressing the situation appropriately Honest and fair prices and practices can prevent detrimental buyer behavior and harm to the buyer–seller relationship

Directions for Further Research

Research in the area of price fairness has been sparse until recently Our framework integrates existing theories of fairness and provides potential directions for further research First, existing research has used the concept of price fairness without explicitly defining it We argue that price fairness is a different concept from that of price unfairness Consumers are clearer and more articulate about what they perceive as unfair prices than they are about fair prices Indeed, price fairness may not even be an issue until consumers perceive a price as unfair We have added affect as an important element of the price fairness concept, and we suggest that there are different types of negative emotions associated with price unfairness perceptions A truly unfair perception is accompanied by strong negative emotions, such as anger and outrage, which may lead to severe actions toward the seller Using qualitatively different emotions as anchors and the cognition of price inequality, we argue that much of existing empirical research on price unfairness can be labeled "less fairness " Although consumers may believe that it is less fair that a department store sells a similar product at a higher price than a discount store, this "less price fairness" perception may not prevent them from shopping at the department store Conceptually distinguishing between less fair and unfair and different types of emotions associated with price inequality helps us focus on the real unfair price situations, which have not received much research attention in marketing

Second, we use similarity and the source of comparison (parties involved in the transactions being compared) as the key concepts of the price comparison process Although previous price fairness research has recognized that fairness judgments are comparative, both the specifics of what is compared (other than price) and how customers choose a comparison source among various available references have not been studied Empirical identification of the characteristics of the comparative transactions that lead to greater similarity and thus greater unfairness perceptions will provide ideas on how to control or reduce such perceptions

Third, we suggest that researchers examine factors that influence price fairness judgments across the spectrum transaction contextual information, procedure information (e g , specific attributions), buyer–seller relationships (e g , different types and dimensions of trust along relationship development), and more generic influences (e g , social norms, consumer knowledge, individual characteristics) Recent research has focused on the influence of cost–profit distributions and buyers' attributions of the causes of price discrepancies (e g , Bolton, Warlop, and Alba 2003, Campbell 1999, Vaidyanathan and Aggarwal 2003) We suggest that the influence of the buyer–seller relationship and the different types and dimensions of trust in the different stages of the relationship are worthy and testable factors In addition, consumers may have different degrees of sensitivity to fairness or equity issues, which provides a potentially interesting covariate for further empirical research (Oliver 1997)

Finally, we have identified potential consequences of perceived fairness or unfairness on both buyers and sellers For buyers, a perceived less fair or unfair price may lead to lower perceived value and/or negative emotions These two consequences may require different coping actions, thus leading to different behaviors It would be informative to test whether and how perceptions of value and negative emotions mediate the relationship between perceived unfairness and the various types of actions that consumers may take In addition, recent research has pointed out that different types of emotions can be qualitatively different and associated with different thoughts and behavioral reactions An examination of different emotions that accompany different degrees of perceived price unfairness may enhance the understanding of consumers' potential responses and consequences to the sellers These consequences and responses provide a basis for broadening the previous research focus beyond buyers' purchase intentions and make important substantive contributions to marketing knowledge

APPENDIX
Summary of Research Relevant to Price Fairness

Author(s)	Proposed Theory	Study	Variables Tested	Key Results
Bolton, Warlop, and Alba (2003)	Fairness judgments may be based on previous prices, competitor prices, and profits, attributions depend on the difference between reference point and price	Tests reactions to perceived differences of historical prices, relation between store-price levels, expected profits, perceived firm costs, and profit sources	Historical prices, store-price image, store strategies, risks, and costs, and perceived price fairness	•People do not have accurate mental cost or profit models for firms •Increases in some firm (fair) costs lead to increased perceived fairness, some costs are unfair for price increases •Price differences are fairest when attributed to quality differences

APPENDIX
Continued

Author(s)	Proposed Theory	Study	Variables Tested	Key Results
Campbell (1999)	Inferred motive and a firm's reputation affect perceptions of price fairness and future shopping intentions	Tests consumer reactions to retail purchasing scenarios, presents variations in the seller's intent and reputation	Firm's reputation, inferred motive, inferred profit, perceived fairness, and shopping intentions	•Relative profit and inferred motive influence fairness perceptions, which in turn affect shopping intentions •A firm's reputation moderates inferences of motive
Collie, Bradley, and Sparks (2002)	When outcomes of others are unknown, judgments vary with procedural fairness, but not when others' outcomes are known	Tests scenarios in which subjects paid more, less, or equal to comparable others and did or did not know others' prices	Knowledge of others' outcomes, outcome fairness, and satisfaction with interaction	•Subjects who did not know others' outcomes rated their outcomes as more fair •It is difficult to judge distributive fairness because of ambiguity of why the outcomes occurred
Darke and Dahl (2003)	Greater satisfaction occurs when the outcome/input ratio of a comparative other is equivalent	Tests scenarios in which subjects received smaller or equal discounts	Bargain size, loyalty status of comparative other, satisfaction, and perceived fairness	•Perceived fairness mediates the bargain size–satisfaction relationship •Perceptions of fairness enhance the value of a bargain
Dickson and Kalapurakal (1994)	Perceived fairness of a price depends on the rule used to set price	Surveys traders of bulk electricity to determine use of and perceived fairness of four cost-based pricing rules and four market-based rules	Frequency of rule use, fairness of rules, and response to perceived unfair prices	•Rules that treat cost increases and decreases symmetrically are fair •Price increases due to demand increases are unfair The more frequently a rule occurs, the fairer the rule is perceived
Frey and Pommerehne (1993)	Consumers evaluate fairness by starting from a fair or just price	Surveys consumers to determine acceptability of rationing excess demand	Fairness judgments and acceptability of allocation alternatives	•Perceived price fairness for a price increase with excess demand is higher when supply may expand •Increasing price to profit from demand is unfair
Huppertz, Arenson, and Evans (1978)	When consumers perceive certain factors in a relationship as inequitable, they seek inequity reduction	Tests consumer judgments of fairness of hypothetical retail exchange situations	Price inequity, service inequity, shopping frequency, item cost, and behavioral response	•Price inequity may dominate service inequity in consumer buying situations •Buyers are more apt to complain when price inequity is high •Frequent buyers are more likely to perceive inequity in a relationship

APPENDIX
Continued

Author(s)	Proposed Theory	Study	Variables Tested	Key Results
Kahneman, Knetsch, and Thaler (1986a)	Dual entitlement Fairness considerations constrain profit-maximizing firms	Surveys consumers to determine standards of fairness applicable to price setting and to understand the effects of fairness rules on market outcomes	Fairness judgments when presented with reference transaction, outcomes of the seller and buyer and the reason behind the changes	•It is fair for a firm to raise prices when faced with increasing costs •It is fair for a firm to maintain prices as costs decline •It is unfair for a firm to benefit from shifts in demand by raising prices
Kalapurakal, Dickson, and Urbany (1991)	Fairness of the dual entitlement principle is subject to context effects and is not as general as previously believed	Conducts experiment with students using three pricing rules over four context scenarios	Perceived fairness of the pricing rule	•Absorbing cost increases and decreases and using cost-plus pricing is more fair than the dual entitlement rule •Fairness perceptions are influenced by information about the seller's costs, margins, profits, and pricing behavior
Kimes (1994)	Yield management practices often encounter perceptions of unfairness	Surveys hotel visitors to gauge their reactions to and perceptions of fairness when presented with different scenarios	Fairness judgments, role of information, role of restrictions and benefits, and perceived differences	Yield management practices would be perceived fair if •Information on varying pricing options is available, •Substantial discounts are given along with reasonable restrictions, and •Products perceived as different have different prices
Martins (1995)	Buyers may compare prices with comparable other buyers, perceptions of price fairness are affected by discrepancies	Manipulates price paid by reference other, reference other income, and product type	Perceived monetary sacrifice and perceived price fairness	•Presence of a price discrepancy is perceived as unfair •Perceived monetary sacrifice is significantly less when reference others pay more and significantly more when reference others pay less
Maxwell (1995)	Fairness judgments depend on economic and social variables	Asks consumers to cite cases of fair and unfair pricing	Price fairness	•Both economical and social components affect determinations of price fairness
Maxwell (1999)	Social norms are important in long- and short-term exchange relationships	Tests consumers' reactions to questions conveying selected firms' pricing	Social norms and personal and societal approval	•A classification system and proposed method of quantifying social norms enables further study of the effects of social norms on consumer transactions

APPENDIX
Continued

Author(s)	Proposed Theory	Study	Variables Tested	Key Results
Maxwell (2002)	If price equals reference price, buyers infer procedural price fairness, if not, consumers have less intention to buy	Tests fairness judgments using two levels of reference price, seller power, levels of justification, and three levels of price procedures	Perceived fair price, attitude toward seller, and willingness to purchase	•Adherence to social norms for pricing procedures forms a basis for fairness judgments •Judged fairness of pricing practices influences attitudes toward the seller and willingness to buy
Maxwell, Nye, and Maxwell (1999)	Self-interest and social utility can exist simultaneously when buyers have been primed for fairness considerations	Examines the fairness and acceptability of prices before negotiation by priming fairness in bargaining scenarios	Fair prices, acceptable prices, and effects of priming	•Priming buyers to consider fairness enables sellers to increase buyer satisfaction without sacrificing profit •Fairness-primed buyers demonstrate more cooperative behavior
Oliver and Swan (1989a)	Fairness perceptions in an exchange result from not only equity dimensions but also satisfaction	Surveys automobile purchasers' perceptions of fairness and satisfaction in an exchange situation	Buyers' and seller's inputs and outcomes, fairness, intention, satisfaction, and disconfirmation	•An exchange is fair if the buyer's outcomes and seller's inputs are high •Intention is influenced by satisfaction, and satisfaction is explained by fairness perceptions
Oliver and Swan (1989b)	Consumers compare inputs and outcomes of other parties with their own on the basis of role expectations Fair price is implicit in this comparison	Surveys automobile purchasers, dealers, and salespeople's perceptions of fairness, satisfaction, preference, and disconfirmation	Buyers', salespeople's, and dealer's inputs, outcomes, fairness, disconfirmation, and satisfaction	•Consumers' perceptions of fairness are stronger when their outcome–input scores exceed the merchant's •Fairness is highly related to satisfaction
Ordóñez, Connolly, and Coughlan (2000)	When making fairness and satisfaction judgments, consumers use multiple reference points	Tests satisfaction and fairness judgments when individuals compared hypothetical salaries offered to MBA graduates	Satisfaction and fairness	•Both advantageous and disadvantageous inequity is unfair, the latter is judged as more unfair •Satisfaction and fairness are distinct from each other
Sinha and Batra (1999)	Consumers are more price conscious when they perceive price unfairness by national brands, such price unfairness leads to purchases of private brands	Surveys 404 shoppers about eight grocery products and uses rating scales	Perceived risk, price versus perceived quality, price consciousness, and perceived price unfairness	•Strong positive effect of perceived price unfairness of national brands on price consciousness •Perceived price unfairness has indirect effect on choice through price consciousness •Nonsignificant relationship between price quality and price unfairness

APPENDIX
Continued

Author(s)	Proposed Theory	Study	Variables Tested	Key Results
Urbany, Madden, and Dickson (1989)	ATM fee with cost justification is more fair than without justification, switching costs inhibit intent to leave bank	Surveys 40 adults with scenario that depicts a bank implementing a new ATM fee	Perceived fairness, behavioral intentions, and switching costs	•Confirm dual entitlement Cost-justified fee is perceived as more fair •Fairness perceptions may not predict behavioral intentions
Vaidyanathan and Aggrarwal (2003)	Inferred causes of price increases affect perceptions of price fairness	Tests fairness judgments with scenarios that provide reasons for price increases	Internal versus external causes of price change, controllability, and perceived fairness	•A price increase caused by external factors and not under the control of the seller is perceived as fair •A cost-justified price increase is not necessarily judged as fair

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Donald R. Lichtenstein, Minette E. Drumwright, & Bridgette M. Braig

The Effect of Corporate Social Responsibility on Customer Donations to Corporate-Supported Nonprofits

Both theory and recent research evidence suggest that a corporation's socially responsible behavior can positively affect consumers' attitudes toward the corporation. The effect occurs both directly and indirectly through the behavior's effect on customer–corporation identification. The authors report the results of four studies designed to replicate and extend these findings. Using a field survey design, Study 1 provides evidence that perceived corporate social responsibility affects not only customer purchase behavior through customer–corporate identification but also customer donations to corporate-supported nonprofit organizations. Using experimental designs, Studies 2 and 3 replicate and extend the Study 1 findings by providing additional evidence for the mediating role of customer–corporate identification on the relationship between corporate social responsibility and customer donations. However, the combined results of Studies 2 and 3 also show that because of a "perceived opportunity to do good" by supporting a company that is changing its ways, consumers are more likely to donate to a corporate-supported nonprofit when the corporation has a weaker historical record of socially responsible behavior. Finally, Study 4 tests the relationship between the nonprofit domain and the domain of the corporation's socially responsible behavior as a boundary condition for this effect.

Each year, companies donate millions of dollars to various nonprofit organizations through various initiatives, including philanthropy, cause-related marketing, employee volunteerism, and other innovative programs. For example, Avon has raised more than $200 million for breast cancer education and early detection services through the Avon Breast Cancer Awareness Crusade. Coca-Cola has signed an agreement to provide $60 million and significant staff time to the Boys & Girls Clubs of America over ten years. Starbucks is the largest North American contributor to CARE, an international relief organization with programs in coffee-growing countries.[1] Patagonia donates 1% of its sales to groups that are focused on environmental protection and restoration. Calphalon, a gourmet cookware manufacturer, has raised millions of dollars to feed hungry people through its sponsorship of Share Our Strength's Taste of the Nation events. Home Depot donates materials and its employees to build houses for Habitat for Humanity. As these examples show, many companies engage in corporate social responsibility (CSR) initiatives (Sen and Bhattacharya 2001; Strahilevitz and Meyers 1998). Companies are called on to address deep and persistent social ills of great magnitude, ranging from malnutrition and HIV to illiteracy and homelessness (Margolis and Walsh 2003). The *Fortune* cover story "America's Corporate Social Conscience" (Ioannou 2004) and the more than $9 billion that U.S. companies alone spent on social causes in 2001 (Cone, Feldman, and DaSilva 2003) provide further testament to corporate involvement with serious social problems.

The increase in CSR initiatives has been prompted both by companies that increasingly recognize it as a key to success and by nonprofits that have ever-increasing needs for resources. Corporate social responsibility refers to the obligations of the firm to society (Smith 2003), and we use the term "CSR initiatives" to refer to the various forms of company involvement with charitable causes and the nonprofits that represent them.[2] Research findings provide sup-

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[1] We note that there often are normative debates about what is and what is not CSR behavior. For example, Starbucks, which has been lauded for its donations to CARE, has also been criticized for its expansion policy that allegedly drives out small independent companies and for its allegedly insufficient use of fair-trade coffee.

[2] Joint nonprofit–company initiatives now encompass a plethora of approaches that extend beyond traditional corporate philanthropy, which historically largely involved companies writing checks in response to fund-raising appeals (Drumwright and Murphy 2001). Nonprofit–company initiatives have been referred to by various terms, including cause-related marketing, corporate social initiatives, joint issue promotion, sales-related fund-raising, social

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port for the benefits that CSR initiatives provide companies, particularly in terms of enhanced consumer perceptions of the company (e g , Brown and Dacin 1997, Drumwright 1996, Sen and Bhattacharya 2001), but more research is needed In particular, little is known about the effects of CSR initiatives on nonprofits Despite some obvious benefits, CSR initiatives can be particularly risky for nonprofits, which usually are the less powerful partner, and they may not ultimately serve the nonprofit's long-term interests (Andreasen 2003, Berger, Cunningham, and Drumwright, in press) It is important not only that nonprofits benefit from CSR initiatives but also that the extent to which firms make effective use of such relationships is ultimately influenced by the benefits to the nonprofits Thus, the purpose of our research is to investigate effects of CSR initiatives on nonprofits and companies

A way that CSR initiatives create benefits for companies appears to be by increasing consumers' identification with the corporation, or customer–corporate (C–C) identification, which is the degree of overlap in a consumer's self-concept and his or her perception of the corporation (Dutton, Dukerich, and Harquail 1994) For example, when a company undertakes a CSR initiative, to the extent that the initiative signals to consumers that the company has traits that overlap with their self-concept (e g , civic minded, compassionate), consumers have higher degrees of identification with the company and, in turn, are more likely to support the company Sen and Bhattacharya (2001) manipulate CSR to find that it positively affects C–C identification In addition, CSR has a positive effect on consumer evaluations of the company, and this effect is partially mediated by C–C identification The rationale for the mediated effect is that when consumers perceive companies as behaving in a socially responsible manner, they are more attractive targets for C–C identification, and they are more likely to support corporations with which they identify

We extend this rationale to hypothesize that CSR-induced C–C identification leads not only to customer support for the corporation but also to increased support for nonprofits that the corporation supports This rationale is based on the premise that when a company visibly aligns with a nonprofit, consumers may reasonably infer that support of the nonprofit is also support of a goal of the corporation with which they identify

Although researchers have recognized benefits that accrue to the entities directly involved in the identification process (e g , Ashforth 1998, Dutton, Dukerich, and Harquail 1994, Elsbach 1998, Glynn 1998, Sen and Bhattacharya 2001), to our knowledge, no research has addressed benefits that may accrue to third parties to the identification process, such as nonprofits As collaborative marketing relationships flourish in various forms (e g , CSR initiatives, cobranding, cross-promotions, strategic alliances), it is particularly important to understand any potential effects of identification on third parties Our research addresses this void with respect to third parties in the context of CSR initiatives that involve both companies and nonprofits

Conceptual Underpinnings and Rationale

Over the past 15 years or so, organizational behavior researchers have studied the process by which people (usually employees) come to identify with some organization (usually the employer company) Researchers have coined the term "organizational identification" to refer to the overlap of a person's self-perceptions with his or her perceptions about the organization For example, Dutton, Dukerich, and Harquail (1994, p 242) define organizational identification as "a cognitive link between the definitions of the organization and the self" They also note that "when [people] identify strongly with the organization, the attributes they use to define the organization also define them" (p 239) The concept has moved beyond the employee to others, such as the consumer (Bhattacharya and Sen 2003, Sen and Bhattacharya 2001)

A factor that is hypothesized to underlie consumer motivation to identify with an organization is the perceived attractiveness of the organization's identity People identify with organizations with which they believe, or with which they want to believe, that they share common traits and that provide for a sense of self-enhancement (Ashforth 1998, Bhattacharya, Rao, and Glynn 1995, Elsbach 1998, Sen and Bhattacharya 2001) Thus, corporations attempt to position themselves in an attractive manner to increase consumer identification with the corporation With the application of this logic to the present study, when a corporation behaves in a manner that is perceived as socially responsible, consumers are likely to infer that it has certain desirable traits that resonate with their sense of self As a result, consumers are more prone to identify with the corporation, in so doing, they behave in a manner that supports the corporation's goals For example, consumers who are aware of Timberland's CSR initiative with City Year, a youth service corps that works with disadvantaged urban youth, might infer that Timberland is compassionate and civic minded[3] If the same customers believe that they too have these traits and thus identify with Timberland, they are more likely to support Timberland by buying its products There is evidence to support this contention (Sen and Bhattacharya 2001), and Bhattacharya and Sen (2003) theorize that the range of identification-driven behaviors extends beyond patronage to include behaviors that support other corporate goals, such as company promotion, customer recruitment, and resilience to negative corporate information

Our research hypothesizes that consumers' identification with a corporation may lead to their support of additional corporate goals that have more direct implications for the welfare of third parties to the identification process, namely nonprofits with which the corporation is affiliated We posit that when a socially responsible corporation is visibly aligned with a nonprofit cause, corporate customers

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alliances, and corporate community involvement (Andreasen 2003, Berger, Cunningham, and Drumwright 2004, Hess, Rogovsky, and Dunfee 2002) Although such initiatives do not adequately represent the totality of a firm's CSR, they are typically designed to be expressions of it

[3] For a description of the Timberland–City Year initiatives, see Austin (2000)

can reasonably infer that support of the cause is a goal of the corporation As such, to the extent that customers identify with the corporation, they are more likely to support the particular nonprofit cause and the corporation Thus, we hypothesize that the perception of CSR positively affects C–C identification, through that identification, customers are more likely to support directly the nonprofits that the corporation supports and the corporation itself (see Figure 1)

Study 1

We assessed constructs depicted in Figure 1 in a field survey of 1000 customers at four locations of a national food chain (n = 250, per store), two in each of two different nearby cities over a two-day period As shoppers paid for their groceries, trained interviewers positioned at the end of the checkout aisles observed whether they handed the cashier a frequent shopper card We restricted the sample to only consumers who used a frequent shopper card because we could track one of the dependent variables (i e , year-to-date dollars spent at the store) for only customers who used the frequent shopper card Interviewers approached the shoppers as they exited the cashier line and asked for their participation in a customer perception study that was conducted by professors from a local university If a shopper agreed to participate, the interviewer asked the shopper to surrender his or her cash register receipt and to answer a few questions Respondents then were given a take-home survey with a postage-paid return envelope addressed to the university and two $3 00 vouchers to encourage participation The customer's store receipt, survey, and vouchers were all cross-coded with identification numbers The two $3 00 vouchers were in the form of two postage-paid postcards addressed to corporate headquarters, either or both of which could be used as cash in the store or mailed to the corporation, which in turn would make a donation to a nonprofit that it supports The reverse side was a postage-paid postcard The vouchers were valid for purchases or donation for three weeks from the time of the study The voucher side of the card is shown in Figure 2 Before conducting the study, we pretested the entire procedure

The take-home survey contained measures of several of the study constructs All scale items, descriptive statistics, reliability estimates, and sources are provided (for all studies) in the Appendix We measured perception of CSR with a five-item scale that assessed perceptions of the corporation's commitment to giving back to the community by supporting nonprofits through both traditional philanthropy (i e , check writing in response to nonprofit fund-raising appeals) and newer forms of CSR initiatives that involve integrating charitable activities into business activities (Drumwright and Murphy 2001, Hess, Rogovsky, and Dunfee 2002) We measured C–C identification by having subjects complete a trait-matching battery of 12 character traits Subjects were provided with 12 traits and asked to circle the 5 that best described themselves and the 5 that best described the corporation We then used the number of traits that customers circled as being common to themselves and the corporation (0–5) as a measure of C–C identification The traits were based on interviews with corporate personnel and customers

We assessed benefits that accrue to the corporation by two different constructs perceptual benefits and behavioral benefits We operationalized perceptual benefits by stan-

FIGURE 1
The Effect of Perceptions of CSR and C-C Identification on Corporate and Nonprofit Benefits

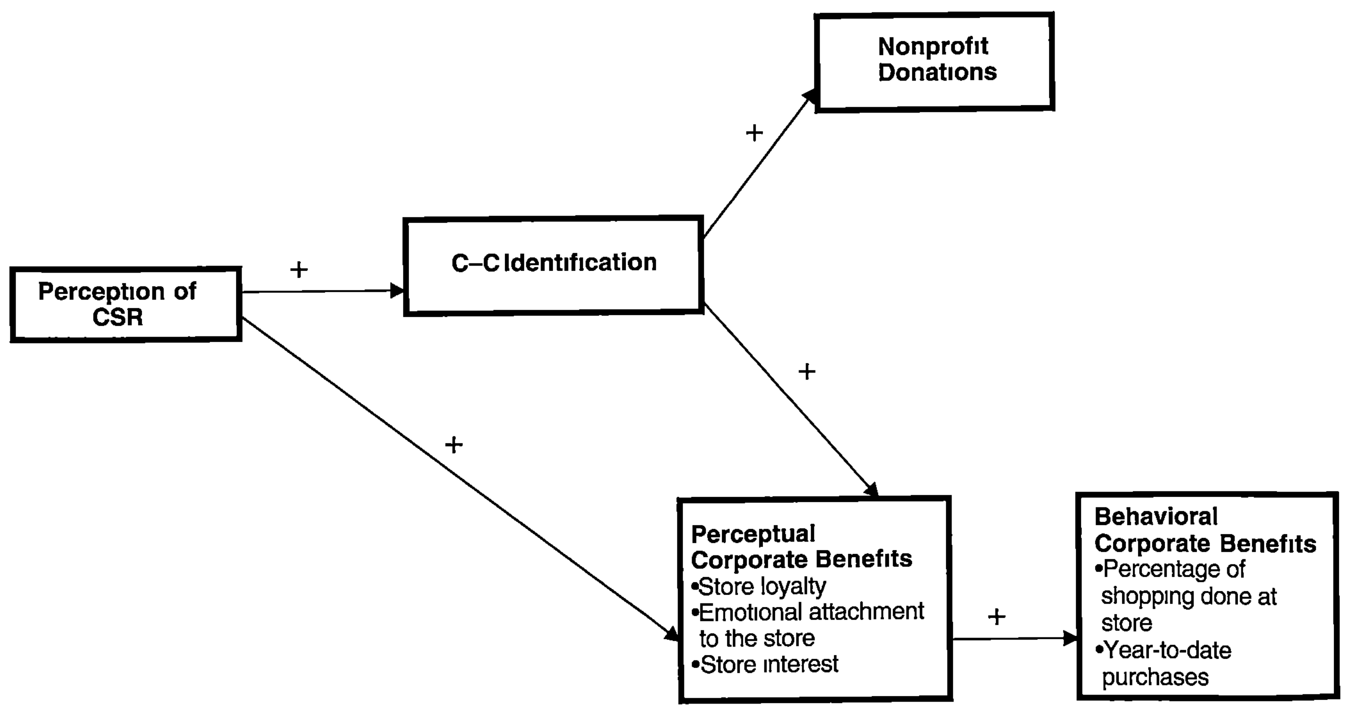
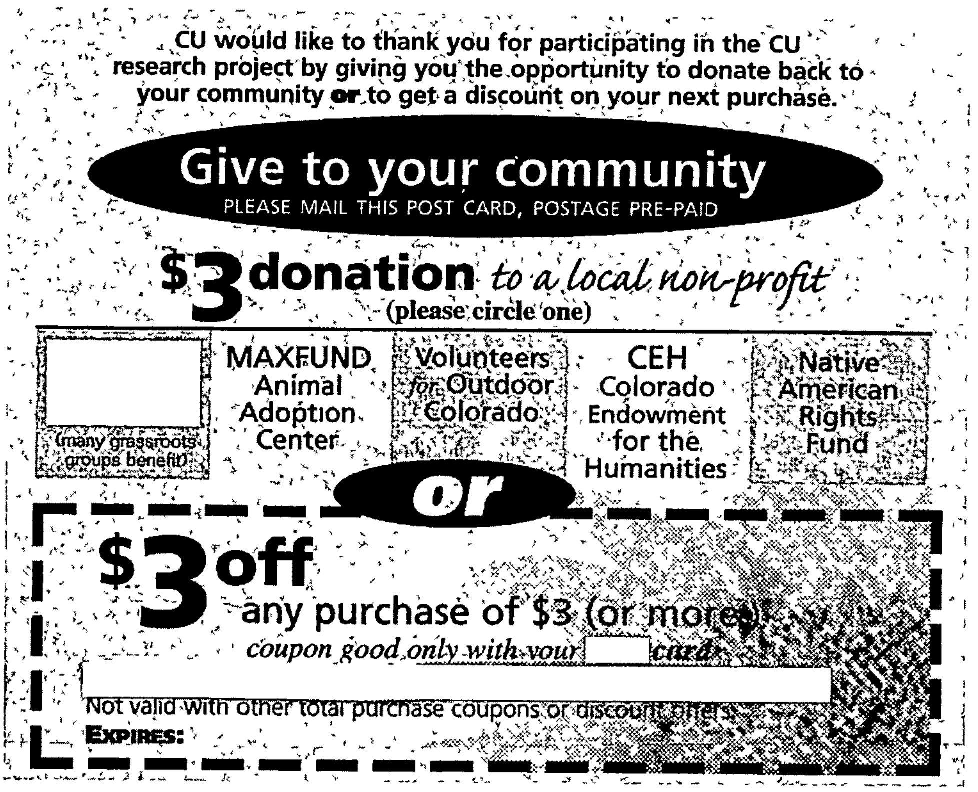

Nonprofit Donations
+
C–C Identification
+
Perception of CSR
+
+
Perceptual Corporate Benefits
•Store loyalty
•Emotional attachment to the store
•Store interest
+
Behavioral Corporate Benefits
•Percentage of shopping done at store
•Year-to-date purchases

FIGURE 2
Donations and Cash Vouchers for Study 1



CU would like to thank you for participating in the CU research project by giving you the opportunity to donate back to your community or to get a discount on your next purchase.

Give to your community

PLEASE MAIL THIS POST CARD, POSTAGE PRE-PAID

$3 donation to a local non-profit
(please circle one)

(many grassroots groups benefit)

MAXFUND Animal Adoption Center

Volunteers for Outdoor Colorado

CEH Colorado Endowment for the Humanities

Native American Rights Fund

or

$3 off any purchase of $3 (or more)
coupon good only with your card

Not valid with other total purchase coupons or discount offers

EXPIRES:

Notes: We sanitized the voucher card here to conceal the identity of the corporation. The first nonprofit on the card was a corporate foundation that supported many local nonprofits.

dardizing and then summing three different measures: (1) a three-item measure that assessed customer loyalty to the store, (2) a four-item measure that assessed emotional attachment to the store, and (3) a single-item measure that assessed customer interest in learning more about the store. We assessed behavioral benefits by standardizing and then summing two measures: (1) a single-item measure through which customers estimated the percentage of their total grocery shopping done at the store and (2) the year-to-date total dollar purchases at the store, printed on the grocery receipt of each customer (printed for all customers who used a frequent shopper card). Because we conducted the study in mid-November, we coded the ten-and-a-half month cumulative dollar amount spent at the store for each customer ($\bar{X}$ = $1,103.09, range = $0–$8,855.00, standard deviation [s.d.] = $1,294.64).

We operationalized nonprofit donation as the customer's decision of whether to use the $3.00 vouchers as cash or to donate them to a nonprofit that the corporation supports. Thus, each customer could have a score of 0 (did not donate either voucher), 1 (donated one voucher), or 2 (donated both vouchers) ($\bar{X}$ = .60, range = 0–2, s.d. = .87).

Results

For the 1000 customers across the four stores who were approached and who agreed to participate in the survey, we deemed 31 of the surveys unusable for various reasons (e.g., customer was an off-duty store employee). Of the 969 respondents who completed the in-store interviews, 508 take-home surveys were completed and mailed back (response rate = 52.4%). Of the 2000 $3.00 vouchers distributed (2 for each of 1000 people), 314 people redeemed a total of 582 for either cash (419) or donation (163).[4] Consistent with the store's target market, the 508 customers who returned their take-home survey were socioeconomically "upscale" The median age group was 35–44, 79% of the sample was female, the median income was $50,000–$64,999, and the median education was college graduate

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[4] Sample sizes reported in the regression analyses for the voucher dependent variable are smaller than for other dependent variables for two reasons. First, because of administrative error, there were several missing values for voucher redemptions. Many of the customers who redeemed the voucher for cash cut along the dashed line (see Figure 2) and redeemed only the inner portion of the voucher. However, we had placed the unique respondent identification number in the upper-right-hand corner of the card; thus, we were unable to match the survey responses or cash register receipts to vouchers of customers who did this. For coding purposes, we coded the donation variable as 2 for people who mailed in both vouchers, as 1 for people who mailed in one voucher, and as 0 for people who did not mail in either voucher but for whom we had a valid (i.e., respondent identification present) redemption for cash. The effect was that we treated some of the cash redemptions as missing values, and we based the interpretation of the donation variable on the population for which we knew either donated the voucher or used it as cash. Although we do not believe that this resulted in any bias, in Studies 2 and 3, there were no missing data on the donation choice variable, and the results were consistent with those of Study 1. The second factor underlying reduced sample sizes for analyses involving the voucher dependent variable pertained to missing values on measures we used as

Tests of Predictions

The results of regression analyses that test hypothesized relationships are reported in Table 1, where each row represents a separate regression model The dependent variables are in the first column, and the independent variables entered into the equation for each of the respective regression models are in subsequent columns As Table 1 shows, perception of CSR was related to perceptual corporate benefits ($p <$ 01), and perceptual corporate benefits were positively related to behavioral corporate benefits ($p <$ 01) Furthermore, perception of CSR was related to C–C identification ($p <$ 01), and C–C identification was related to perceptual corporate benefits ($p <$ 01) Finally, C–C identification was related to nonprofit donations ($p <$ 01)

Discussion

Findings of Study 1 provide support for the proposition that the beneficiaries of organizational identification are broader than has previously been conceptualized In addition to benefits that accrue to organizations and individuals, Study 1 provides evidence that customers who identify more strongly with the corporation are more likely to donate to corporate-supported nonprofits The findings from Study 1 also are consistent with the proposition that CSR has both a direct and an indirect effect, through C–C identification, on corporate benefits Although Sen and Bhattacharya (2001) find evidence in support of this by manipulating CSR and assessing student subject response in a lab setting, our research provides support in a field setting with actual shoppers as subjects and actual purchase behavior as a dependent variable Thus, the results of the two studies jointly provide support for the internal and external validity of our finding

However, our findings must be considered in light of the study limitations, most of which pertain to the use of a correlational field design For example, three limitations include the inferring of construct sequence from cross-sectional data, respondent self-selection, and the possibility of omitted variable bias Another limitation is the missing values in the data in general and (partially due to administration error) the voucher redemption variable in particular In addition, there are theoretical questions about the operationalization of CSR We operationalized CSR using measures of the corporation's commitment to supporting nonprofits However, CSR has been conceptualized more broadly as the company's status and activities with respect to its perceived societal obligations (Brown and Dacin 1997, Hess, Rogovsky, and Dunfee 2002, Sen and Bhattacharya 2001, Smith 2003) Thus, our measures may underrepresent the CSR construct The generalization of results to the CSR construct would be enhanced by a broader operationalization with regard to how the corporation performs its core business activities Consequently, given the number of remaining questions about the influence of CSR on donation behavior, we conducted a second study

Study 2

In Study 2, 61 subjects enrolled in marketing courses were randomly assigned to one of two experimental conditions Subjects were given an experimental packet that consisted of four pages (the second page contained the manipulation) followed by several pages of dependent measures Subjects were told that the experimenters were working with a company that produced computers and calculators, which, for reasons of confidentiality, would simply be referred to as Company X in the materials that they would read They

TABLE 1
OLS Regression Unstandardized Betas for Study 1 Variables

	Independent Variables					
Dependent Variables	**Perception of CSR**	**C–C Identification**	**Perceptual Corporate Benefits**	**Degrees of Freedom**	**Model F**	**Model R^2/ Adjusted R^2**
Perceptual corporate benefits	20**			1, 428	95 58**	18/ 18
		67**		1, 475	48 56**	09/ 09
	18**	54**		2, 427	68 07**	24/ 24
Behavioral corporate benefits			31**	1, 471	86 18**	15/ 15
	06*			1, 446	9 70*	02/ 02
	– 01		32**	2, 425	38 09**	15/ 15
C–C identification	03**			1, 449	9 87**	02/ 02
Nonprofit donations		15**		1, 211	9 35**	04/ 04
	02			1, 189	2 28	01/ 00
	01	14*		2, 188	4 40*	05/ 04

*$p <$ 05
**$p <$ 01

---

independent variables to predict voucher redemptions in the regression analyses Specifically, some of the 314 voucher redeemers did not return a survey Thus, for analyses for which we assessed predictor variables in the survey, sample sizes were further reduced Follow-up analyses revealed no significant differences on several variables assessed during the store encounter between voucher redeemers who did and did not return their surveys were told that Company X was researching to gain information for input into a decision about whether it should offer a unique type of promotion However, subjects were told that before they "responded" to the promotion, they needed to have an understanding of Company X and its corporate practices and attitudes so that they would be able to evaluate the promotion in context Company X's corporate practices then were presented in a scenario description that served as the manipulation The positive condition explained that Company X had been a "pioneer" in issues of combating sweatshop conditions in overseas manufacturing, and the negative condition explained that Company X had been a "laggard" on this issue (this is the exact CSR manipulation that Sen and Bhattacharya [2001] use) Because Sen and Bhattacharya show these manipulations to have an effect on C–C identification, our use of them increased our confidence that we would obtain the necessary variance in C–C identification to test for its effect on the outcome variable of primary interest (i e , nonprofit donations) This manipulation of CSR is also broader and more encompassing of the construct as Brown and Dacin (1997), Hess, Rogovsky, and Dunfee (2002), Sen and Bhattacharya (2001), and Smith (2003) conceptualize than that in Study 1

After reading the scenario, subjects were told that to understand the promotion that Company X was considering, it would help to review a Barnes & Noble promotion, because Company X's promotion would be patterned after it The experimenter then reviewed an actual Barnes & Noble promotion with the subjects to make certain that they understood it (see Figure 3) As Figure 3 shows, the promotion allowed existing customers of Barnes & Noble to receive a 5% commission for referring new customers to Barnes & Noble, or customers could elect to have the commission donated directly to one of five nonprofits that Barnes & Noble supports The experimenter then told subjects that given Company X's record on sweatshop operations, they were considering a similar promotion Subjects then reviewed a description of the product that Company X was considering placing on promotion (i e , the Model #XP15 calculator) and the promotion itself The promotion was described as follows

> Given its record on issues of international fair labor practices, Company X is considering introducing a new "International Fair Labor Partnership Program" on its best-selling calculator (Model #XP15) The International Fair Labor Partnership Program is designed to represent a partnership between Company X and nonprofit organizations that have increasing monitoring of fair labor practices in "less-developed countries," especially manufacturing "sweatshops," as their focus The program would run through Company X's online ordering on its Web site Here is how it would work

1 A customer visits Company X's Web site to purchase the Model #XP15 calculator
2 The customer will be able to click on one of the following two pricing options

This description was followed by two boxes that were designed to look like Web-clickable boxes In each of the two boxes, the pricing option was named (see the Appendix) Directly under each box was a description that detailed the implications of choosing the particular pricing option The first box contained the text "You Pay the 5% Discounted Price of $123 45, You Save $6 50" and was accompanied by the text "If the customer chooses this option, the customer keeps the 5% ($6 50) discount" The second box contained the text "You Pay the Regular Price of $129 95, You Donate $6 50 to Nonprofits" and was accompanied by the following text

> If the customer chooses this option, the customer gets to donate 5% ($6 50) of the purchase price to a nonprofit organization that has promoting international fair labor practices as its goal Clicking on this option brings up a Web page where five different fair labor practice–related nonprofits appear on the screen, and the customer can click on the one that he or she wants to receive the $6 50 donation

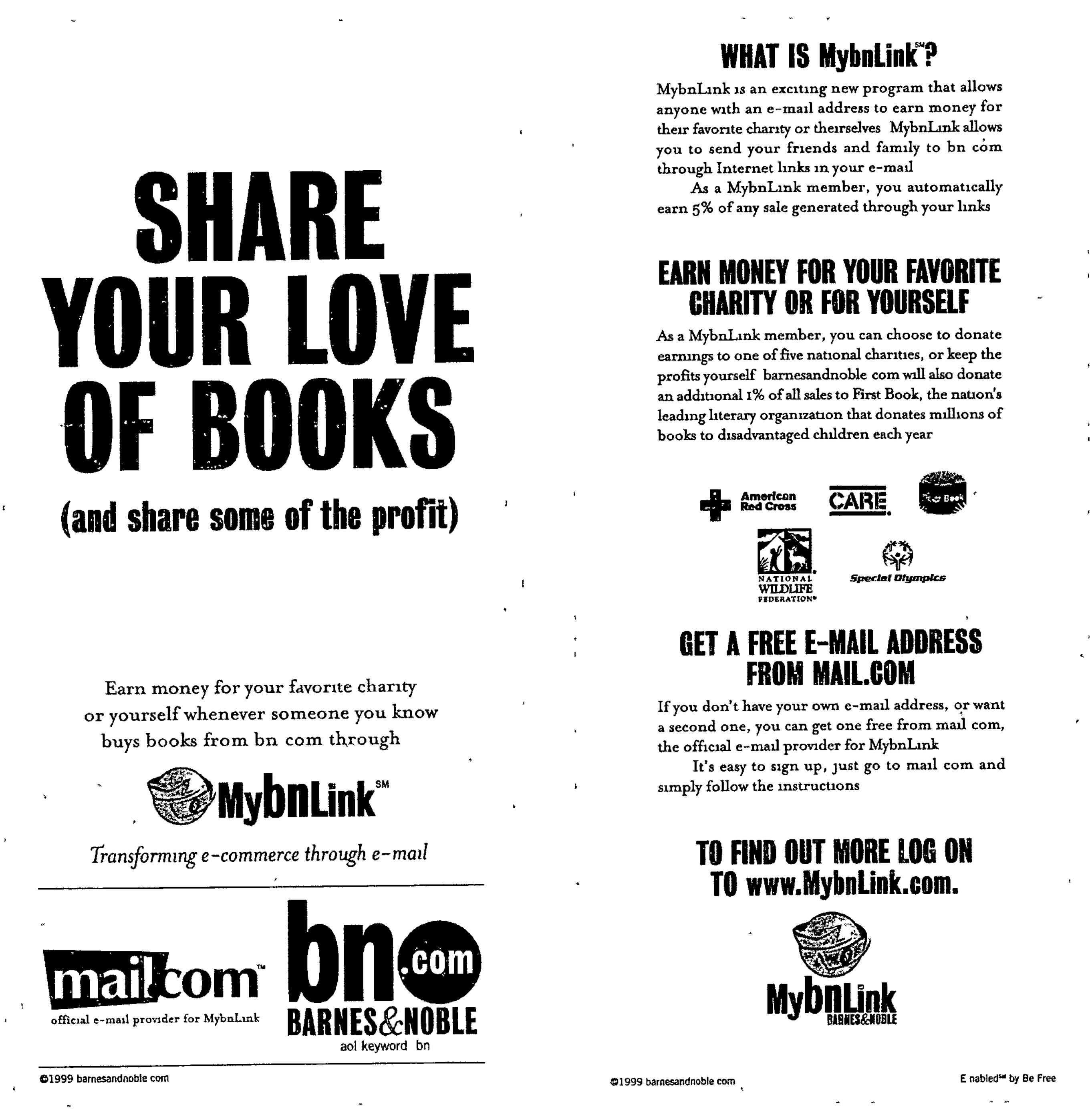
The experimenter then verbally reviewed the promotion with subjects to ensure that all subjects understood it, after which subjects responded to the dependent measures on the pages that followed Respondents then were debriefed and thanked for their participation

Dependent Measures

Dependent measures included a five-item manipulation check scale to assess the success of the experimental manipulation Because subjects might respond differentially to a given nonprofit cause on the basis of the importance of the cause to them, we added a six-item scale to assess the perceived importance of issues in the manufacturing sweatshop domain As we noted previously, we developed the operationalization of C–C identification used in Study 1 and customized it to the specific natural foods supermarket that represented the target of identification Given this and our use of Sen and Bhattacharya's (2001) scenario manipulations in Study 2, we also assessed the C–C identification construct with the same two operationalizations that they used and showed to be sensitive to the scenario manipulations across two studies The first of the two measures is a Euclidean distance measure based on subjects' responses to 40 scale items that assessed perceptions of both themselves and Company X across 20 common traits The second measure we used to assess C–C identification was Bergami and Bagozzi's (2000) seven-point, single-item identity circle measure of the overlap between self and organization We coded the two measures of C–C identification so that higher values reflected higher identification, and we standardized and summed them to form a two-item scale

Finally, subjects responded to two donation measures The first measure assessed probability of donation on a seven-point scale The second measure was a dichotomous donation choice measure We initially standardized and summed the two measures to form an overall measure However, because analyses showed that the dichotomous measure was more sensitive to the manipulation and other study constructs, we used it alone for testing the hypothesized relationships

FIGURE 3
Barnes & Noble Promotion



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Tests of Predictions

Before testing the predictions, we conducted an analysis of variance to assess the success of the experimental manipulation. The effect of the manipulation on the manipulation check was significant ($F_{1, 59} = 128.74$, $p < .01$, and $\bar{X} = 14.90$ and 29.22 for negative and positive conditions, respectively). The results of regression analyses that test the relationships between study variables are reported in Table 2. As Table 2 shows, when the CSR manipulation was the sole predictor, it had a direct effect on C–C identification ($p < .01$) but not on nonprofit donations. In addition, the bivariate relationship between C–C identification and nonprofit donations was not significant, but when we used both CSR and C–C identification as predictors of nonprofit donations, both were significant ($p < .05$). However, the direct effect of the CSR record was unexpectedly negative

TABLE 2
OLS and Logistic Regression Unstandardized Betas for Study 2 Variables

	Independent Variables					
Dependent Variables	Manipulation of CSR	C–C Identification	Nonprofit Domain Importance	Degrees of Freedom	Model F/ −2 Log-Likelihood[a]	Model R^2/ Adjusted R^{2b}
C–C identification	2 85**			1, 55	80 33**	59/ 59
Nonprofit donations		10		1	70 67	01
	− 77			1	75 28	03
	−3 30*	84*		2	63 01*	13
	−2 74	75*	08	3	61 25*	16

*$p <$ 05
**$p <$ 01
[a] For logistic regressions, this is the log-likelihood ratio, in addition, the significance level refers to the likelihood ratio chi-square
[b] For logistic regression, the R^2 values are Cox and Snell's R^2 values
Notes We estimated models using OLS and logistic regression for continuous/dichotomous dependent variables For ease of readability, we indicate logistic models for which there is a single numeric value for degrees of freedom

A positive record on fighting sweatshops led to a *decrease* in customer donations Thus, CSR had a direct, negative effect on donation choice and an indirect, positive effect on donation choice through C–C identification Finally, nonprofit domain importance did not significantly affect donation behavior (nor was it affected by the manipulation)

Discussion of Results

Consistent with Study 1, Study 2 provides evidence for the indirect, positive effect of CSR on donation behavior, through C–C identification However, Study 2 also provides an unexpected finding When the CSR record is accompanied by C–C identification as a second predictor, it has a direct, negative effect on nonprofit donations It seems to be counterintuitive that a positive record on social issues leads to fewer nonprofit donations in the particular domain while also leading to increased identification (Studies 1 and 2), increased donations as a result of identification (Studies 1 and 2), and more favorable corporate perceptions (Study 1) However, it is possible that consumers identify with a corporation that "does the right thing" (thereby leading to increased corporate benefits) but do not believe that corporations should ask consumers to donate directly to nonprofits Perhaps by supporting socially responsible corporations with their purchases, consumers believe that they have done their share (i e , they have "given at the office", Andreasen and Drumwright 2001) and thus that corporations cross a boundary when they ask consumers to make additional donations Given the potential implications of this finding, we conducted a third study to explore this effect further

Study 3

We designed Study 3 on the basis of Study 2, but we included additional measures to assess possible explanations for the negative effect of CSR on donations We added a three-item scale to assess the "corporate boundary" explanation we provided previously Furthermore, after the donation choice measure, we added an open-ended question that asked subjects about the reasons for their choice Finally, we assessed the seven-point donation probability scale along with the dichotomous choice measure We standardized and summed the measures as the operationalization of donation choice

Coding of Open-Ended Responses

Before we tested study relationships, responses to the open-ended question were coded into categories The experimenter first read through all responses and, on the basis of the reading, constructed ten categories Then, two coders who were blind to the experimental conditions independently coded each of the responses across all ten categories Three categories emerged that contained enough responses to be relevant and that did not overlap with factors already assessed by scale items They were "to save money" (i e , frugality), "negative attributions about Company X," and "perceived opportunity to do good" Coder agreement across categories was 100%, 99%, and 91%, respectively Discrepancies between coders were reconciled after discussion with the experimenter

Tests of Predictions

Before testing the predictions, we conducted an analysis of variance to assess the success of the manipulation The effect of the manipulation on the manipulation check was highly significant ($F_{1,90}$ = 500 45, $p <$ 01, $\bar{X}$ = 8 24 and 28 43 for negative and positive conditions, respectively) The results of the regression analyses that test study relationships are reported in Table 3

Consistent with results of Studies 1 and 2, the CSR manipulation positively affected C–C identification Also consistent with Study 2, when we used the CSR manipulation and C–C identification simultaneously as predictors of nonprofit donations, both were significant ($p <$ 05) Furthermore, the direction of effects was consistent with the results in Study 2, C–C identification had a positive effect and CSR had a negative effect on donations

To investigate the relationship between CSR and donation choice further, we added the additional variables assessed in Study 3 to the analysis First, we individually

TABLE 3
OLS and Logistic Regression Unstandardized Betas for Study 3 Variables

	Independent Variables									
Dependent Variables	**Manipulation of CSR**	**C–C Identification**	**Negative Corporate Attributions**	**Nonprofit Domain Importance**	**Corporate Boundaries**	**Frugality**	**Perceived Opportunity to Do Good**	**Degrees of Freedom**	**Model F/ –2 Log-Likelihood[a]**	**Model R^2/Adjusted R^{2}[b]**
C–C identification	2 83**							1, 86	130 21**	60/ 60
Negative corporate attributions	–2 27**							1	72 16**	13
Perceived opportunity to do good	–1 58**							1	83 16**	08
Nonprofit donations		22						1, 86	3 88	04/ 03
	09							1, 90	06	00/ 00
	–1 27*	49*						2, 85	4 12*	09/ 07
	– 63	33**	–1 18**	05*	– 08*	–1 33**	1 95**	7, 79	18 01**	62/ 58

*$p < 05$

**$p < 01$

[a] For logistic regressions, this is the log-likelihood ratio, in addition, the significance level refers to the likelihood ratio chi-square

[b] For logistic regression, the R^2 values are Cox and Snell's R^2 values

Notes We estimated models using OLS and logistic regression for continuous/dichotomous dependent variables For ease of readability, we indicate logistic models for which there is a single numeric value for degrees of freedom regressed corporate boundary, domain importance, frugality, negative Company X attributions, and perceived opportunity to do good on the manipulation using ordinary least squares (OLS) or logistic regression as appropriate Corporate boundary, domain importance, and frugality were not affected by the manipulation, however, both negative attributions toward Company X and perceived opportunity to do good were affected by it (both at $p < 01$, see the second and third regression models in Table 3)

Second, we regressed donation behavior on frugality, negative Company X attributions, corporate boundary, domain importance, organizational identification, perceived opportunity to do good, and the CSR manipulation As is shown in the last regression model in Table 3, with the exception of the CSR manipulation, all variables were significant ($p < 05$ or better) and in the hypothesized direction Follow-up analyses showed that when perceived opportunity to do good was absent/present in the model, the CSR manipulation had/did not have ($p < 01$ and $p > 10$, respectively) a negative effect on the donation measure, and this was the only variable that mediated the negative relationship In line with Kenny, Kashy, and Bolger's (1998) procedures, with all other variables in the model, perceived opportunity to do good completely mediated the effect of the CSR manipulation ($z = 4\ 37$, $p < 01$)

Discussion of Results

The findings in Study 3 replicate and extend findings from Studies 1 and 2 Of particular interest in Study 3 is the negative relationship between CSR and consumer donation behavior This negative effect may be generated by a differential negative influence on respondents in the positive scenario to give or a differential positive influence on those in the negative condition to give From our review of the nature of the open-ended responses to perceived opportunity to do good, it seemed that many respondents stated motivations that could not be present in the positive condition For example, a more frequent reason that was coded in this category was the "desire to help Company X change its ways" or, in other words, to help rehabilitate Company X This represents a motivation to give in the negative condition that is not present in the positive condition, and it results in the negative relationship mediated by perceived opportunity to do good Thus, from a substantive perspective, the mediated negative effect of CSR on customer donations is a positive outcome for nonprofits because it reflects a desire for consumers who were in the negative condition to donate rather than a motivation for consumers in the positive condition not to donate

That said, an issue that remains unaddressed by the Study 2 and 3 results pertains to boundary conditions for the negative relationship between CSR and donation behavior Specifically, an aspect of the promotion that may have implications for this relationship is the connectedness of the nonprofit domain to that of Company X's CSR record In both Studies 2 and 3, consumers could choose to donate to one of five charities that targeted unfair labor practices in foreign manufacturing operations, which was the exact domain in which Company X had a poor record of CSR behavior (in the negative condition) Seemingly, for consumers in the negative condition to be motivated to give, they would need to perceive Company X as sincere about changing its ways Thus, when the nonprofits were in the same domain as when Company X had previously behaved in a socially irresponsible manner, there was a "match" in that Company X was undertaking behavior to address its previous negative behavior However, consider a situation in which the nonprofits are in a domain other than that in which Company X has a poor record of CSR behavior (e g , increasing the reading skills of youths) Consumers may be less likely to perceive this as a sincere effort on the part of Company X to change its ways because the company is silent about whether it is trying to "right its wrongs" Rather, consumers may make some other attribution (e g , a public relations ploy) Consequently, as a boundary condition on the direct, negative relationship found in Studies 2 and 3, there is reason to expect that the nonprofit domain must be connected to the domain in which Company X had previously behaved in a socially irresponsible manner We designed Study 4 to test for this boundary condition

Study 4

We designed Study 4 on the basis of Studies 2 and 3, and the major differences are the addition of a second independent variable and the inclusion of additional dependent measures[5] Specifically, 115 subjects participated in one of four experimental sessions in a 2 × 2 between-subjects design in which each of the four sessions was randomly assigned to one of the experimental conditions We used the same operationalization of CSR behavior as in Studies 2 and 3, so Company X had either a positive or a negative record in overseas manufacturing practices (coded as 1 and 0, respectively) The other variable was connectedness of the nonprofit domain to the domain of Company X's previous CSR behavior In the connected condition, the nonprofits were the same as in Studies 2 and 3 They had "promoting international fair labor practices" as their goal (coded as 1) In the unconnected condition, they had "increasing the reading skills of America's youth" as their goal (coded as 0)

Dependent measures included C–C identification, corporate boundaries, and nonprofit donations, all of which we assessed as in Study 3 We also included two single-item measures to capture frugality and negative corporate attributions, both of which were open-ended variables in Study 3 We also measured nonprofit domain importance in Study 4 However, because we manipulated the nonprofit domain in Study 4, we developed new measures that, with minimal alteration of wording, assessed nonprofit domain importance for overseas manufacturing practices and reading skills of U S youths, respectively In addition, we included two variables to assess their potential impact on donation choice First, we included a single-item measure to assess respondents' self-perceptions of social consciousness Second, on the basis of Hess, Rogovsky, and Dunfee's (2002) contention that CSR is evidenced by corporate programs that reflect the core values of the firm, we included a measure that assessed this perception (which we called "promotional consistency with core values")

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[5] On the basis of the suggestion of a reviewer, we also dropped the introductory phrase "Given its record on issues of international fair labor practices" from the description of the promotion

Results

The results of regression analyses for Study 4 are provided in Table 4 Consistent with previous studies, CSR had a positive effect on C–C identification ($p < 01$), as did connectedness ($p < 05$, see the first model) As in Study 3, CSR negatively affected the propensity for respondents to make negative attributions toward Company X ($p < 01$, see the second model) In addition, CSR positively affected respondent perception that the promotion was consistent with Company X's core values ($p < 01$, see the third model) Finally, respondents perceived the connected nonprofit domain (fair labor practices) as significantly less important than the unconnected domain (reading skills) ($p < 05$, see the fourth model) None of the other variables were affected by the manipulations

The results relevant to the central question motivating Study 4 are provided in the final model in Table 4 There is a significant interaction between the two manipulated variables ($p < 05$) Replicating the results of Studies 2 and 3, the tests of the simple effects show that when the nonprofit domain was connected, the effect of CSR on donation behavior was negative (beta = –1 23, $p < 05$) However, when the nonprofit domain was unconnected, CSR had no effect on donation behavior ($p > 10$)[6] Beyond this effect, nonprofit domain importance and promotional consistency with core values both positively affected nonprofit donations ($p < 05$ and $p < 01$, respectively), and frugality negatively affected nonprofit donations ($p < 01$) However, inconsistent with previous studies, C–C identification and corporate boundaries failed to affect donation choice

Given the centrality of the relationship between C–C identification and nonprofit donations to the current investigation, in conjunction with the findings in Studies 1–3 of a significant relationship between the two variables, we performed additional analyses to gain insights into the nonsignificant relationship between C–C identification and nonprofit donations in Study 4 Specifically, we estimated three models in which we first regressed the donation variable on C–C identification, then on C–C identification, CSR record, and connectedness, and finally on C–C identification, CSR record, connectedness, and CSR record × connectedness The unstandardized beta and associated significance level for C–C identification in the three models was 19 ($p < 06$), 21 ($p < 12$), and 19 ($p < 15$), respectively The near-significant bivariate effect in the first model, in conjunction with the decreasing level of statistical significance as we added the additional independent variables, suggests that the lack of an effect is at least partially the result of collinearity between C–C identification with the other independent (and manipulated) variables The significant effect of both manipulations on C–C identification is consistent with this explanation Furthermore, the reduced beta estimate (in relation to the 19 bivariate beta estimate) of C–C identification in Table 4 suggests that some explanatory power of C–C identification is attenuated by the additional independent variables estimated in the final model in Table 4 In particular, the respondent's perception of promotional consistency with core values in Study 4 was correlated with C–C identification and nonprofit donations at 66 and 31, respectively Thus, when we added this variable as a predictor to the third model, the unstandardized beta for C–C identification dropped from 19 to 01 This was the only added variable in Study 4 that produced such a drastic effect Because this variable was only present in Study 4, it accounts for much of the obtained difference in the relationship between C–C identification and nonprofit donations compared with that in the previous studies

General Discussion

The results of our four studies (one field-based survey and three follow-up laboratory experiments) provide support for the notion that CSR behavior can result in (1) an array of corporate benefits (e g , more favorable corporate evaluations, increased purchase behavior) and (2) increased nonprofit benefits in the form of consumer donations to corporate-supported nonprofits The relationships we found among all constructs investigated across the four studies provide general support for the model provided in Figure 4

CSR and Corporate Benefits

The Study 1 results provide evidence that CSR has both a direct and an indirect effect, through C–C identification, on perceptual corporate benefits, which in turn translate into behavioral corporate benefits These findings, which we obtained in a natural field setting using consumer purchases as a measure of behavioral corporate benefits, support the external validity of benefits that companies can realize through CSR Given the convergence of results from Study 1 with the results of the lab experiment of Study 2 and with Sen and Bhattacharya's (2001) experimental results, there is strong support for the direct and indirect effects of CSR on corporate benefits

CSR and Nonprofit Benefits

Our results also show that CSR may provide benefits from the identification process to third parties Specifically, across three of the four studies (one in which we measured CSR and two in which we manipulated it), CSR had an indirect, positive effect on nonprofit donations through C–C

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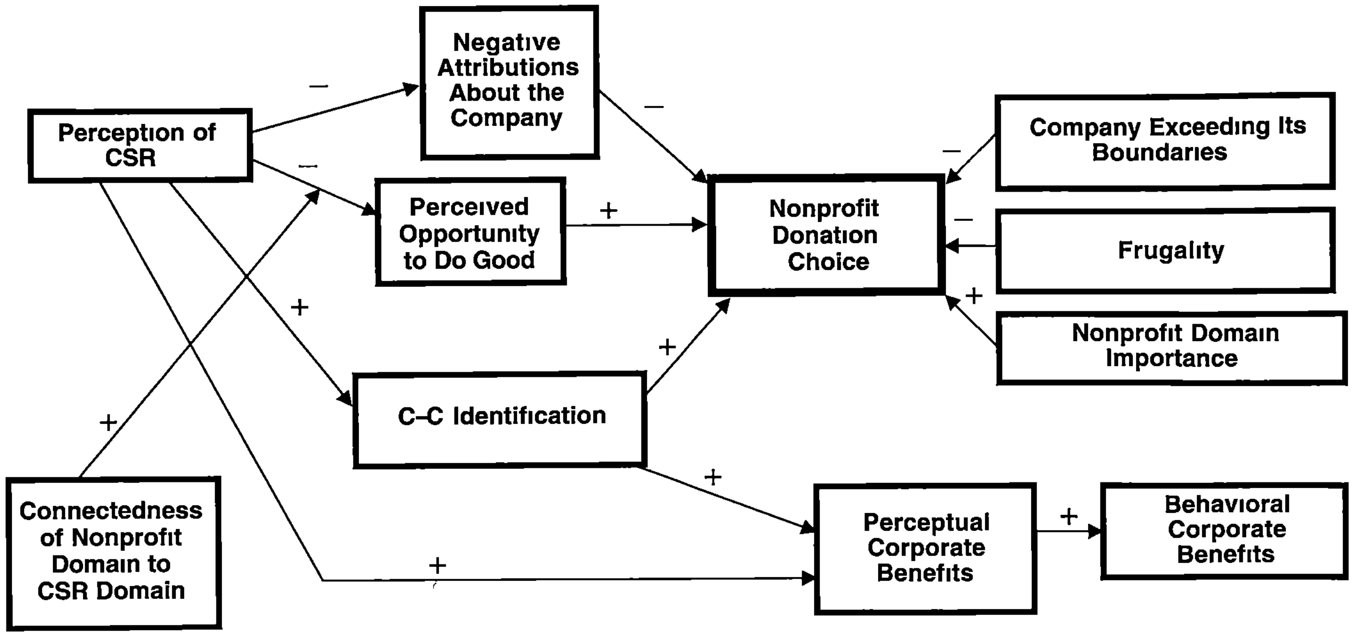
[6] Because of a loss of statistical power, our splitting the sample on the basis of the level of the connectedness manipulation and our investigating the effect of CSR on donation choice revealed nonsignificant effects in both levels of connectedness However, to aid substantive interpretation of the overall interaction, we estimated both models The results showed that for the unconnected condition, the unstandardized beta for CSR record was – 16, t = – 28, and $p < 78$ These values for the connected condition were –1 00, t = –1 29, and $p < 22$, respectively Thus, considering these effects in the context of the significant overall interaction (and the significant simple effect) for the total sample, the effect of CSR on donation choice was negative in the connected condition but not in the unconnected condition

TABLE 4
OLS Regression Unstandardized Betas for Study 4 Variables

Dependent Variables	Independent Variables										Degrees of Freedom	Model F	Model R^2/ Adjusted R^2
	Manipulation of CSR	Manipulation of Connectedness	CSR × Connectedness Interaction	C–C Identification	Negative Corporate Attributions	Nonprofit Domain Importance	Corporate Boundaries	Frugality	Promotional Consistency with Core Values	Social Consciousness			
C–C identification	2 55**	77*	– 71								3, 105	24 08**	41/ 39
Negative corporate attributions	–1 67**	– 34	– 71								3, 111	7 84**	17/ 15
Promotional consistency with core values	2 63**	29	61								3, 111	30 23**	45/ 44
Nonprofit domain importance	97	–3 75*	2 23								3, 111	4 01**	10/ 07
Nonprofit donations	02	67	–1 25*	01	– 01	07*	– 06	– 33**	31**	– 09	10, 97	8 90**	48/ 43

*$p <$ 05
**$p <$ 10

FIGURE 4
The Effect of Perceptions of CSR on Corporate and Nonprofit Benefits


Perception of CSR
Negative Attributions About the Company
Perceived Opportunity to Do Good
C–C Identification
Connectedness of Nonprofit Domain to CSR Domain
Nonprofit Donation Choice
Company Exceeding Its Boundaries
Frugality
Nonprofit Domain Importance
Perceptual Corporate Benefits
Behavioral Corporate Benefits
–
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identification In addition, for all three studies in which the nonprofit domain was the same (i e , "connected") as that for which the company had a record of CSR (i e , for Studies 2 and 3 and the connected condition in Study 4), there was a negative, direct effect of CSR on donation choice

However, that the effect of CSR on donation choice was negative in a statistical sense should not be equated to a negative effect in a substantive sense The results of Study 3 provide evidence that the negative effect occurred because socially conscious people in the negative CSR condition had a motivation to donate that people in the positive condition did not have The mediated negative relationship suggests that when corporations with a poor record of CSR attempt to change their ways by affiliating themselves with nonprofits, consumers in the negative condition who perceive an opportunity to do good by helping rehabilitate the corporation have a different motivation to give than do consumers in the positive condition This finding seems akin to variables related to promoting change in a recent study of consumer boycotting behavior Klein, Smith, and John (2004) find that variables that reflect a boycotter's desire to bring about some kind of change and to communicate a message to the target firm are important moderators of a consumer's decision to boycott Likewise, upon encountering a company with a poor record on social responsibility, some consumers viewed the donation to the corporate-supported nonprofit as a way to support a company that had made the decision to "do the right thing" and possibly as a way to communicate support to the company

That said, we emphasize that our findings should not be taken to suggest that it is to a nonprofit's benefit more to partner with a company that has recently changed its ways than to partner with a company with a consistently strong CSR record Rather, our findings suggest that there is a positive influence that may be realized by their doing so The results of follow-up regression analyses in Study 3 reveal that the positive effect of a historical record of CSR on customer donations (through reduced negative attributions and increased identification) is three times that of the negative effect (through perceived opportunity to do good) Thus, our results suggest that it is in a nonprofit's interest to partner with companies with a strong historical record of CSR

Another issue that warrants consideration is the generalizability of our findings At a theoretical level, we believe that the type of promotion we used corresponds to many marketplace decisions that consumers commonly make For example, Hess, Rogovsky, and Dunfee (2002) note that consumers often face trade-offs between their desire for lower-priced goods and their moral desires (e g , donation of a dollar to a retailer-sponsored charity at time of payment, donation of a can of food to a "feed the hungry" charity when exiting a grocery store) As with the Barnes & Noble promotion, these types of decisions involve trade-offs between consumer economic self-enhancement and altruistic socially responsible behavior Couched at this level of abstraction, our theory would predict that to the extent that a corporation (e g , a grocery chain) is perceived as socially responsible, it will engender greater identification among its customer base, thus leading customers to make the trade-off of economic self-enhancement (e g , donate rather than keep canned food) in favor of their moral desires, in the form of supporting third-party nonprofit causes (e g , a particular homeless shelter) that are affiliated with the corporation

Following this logic, we view these findings as having important implications for theory To our knowledge, this is the first demonstration of transference of the affect and goodwill that a customer has for a corporation to a third-party organization. In addition, the mechanism by which this transference occurs is specified and empirically supported across three of four studies.

Managerial Implications for Nonprofits

Nonprofits can benefit from CSR not only through the donations and other resources that companies provide but also through donations from the company's customer base through corporate–nonprofit promotion programs. This provides an attractive "double-kick" for nonprofits and mitigates concerns that a nonprofit's involvement with the company will lessen its support among the company's customers. Beyond that, our studies provide guidance to nonprofits in choosing company partners. First, nonprofits should choose company partners that are attractive targets for C–C identification and already are adept at prompting it. Ideally, a company partner should have a strong CSR record, and its organizational values should be widely perceived as consistent with the CSR initiative. The risk to a nonprofit is always increased when a company partner has a tarnished CSR reputation. However, our findings suggest that if the dimension on which a company's CSR record has been criticized is related to the nonprofit's cause, the risk may be offset, at least in part, by support from consumers who perceive the CSR initiative as a genuine attempt by the company to reform its ways. Second, at a minimum, nonprofits that are considering working with a company with a tarnished record should be certain that the CSR initiative and their involvement in it can be clearly and credibly positioned as a genuine and enduring attempt to reform on the company's part.

Managerial Implications for Companies

Corporate social responsibility can be a viable promotional strategy that leads to broader company benefits than immediate purchase behavior. The finding that company benefits are based, at least in part, on C–C identification has several implications. An important implication pertains to the building of corporate brand equity. Some scholars have identified our measures of perceptual corporate benefits (company loyalty and emotional attachment to the company) as measures or strong correlates of brand equity (see Keller 1998). Moreover, the creation of meaningful associations that pertain to an organization's identity is particularly key to building a strong brand identity. Aaker (1996) argues that organizational identity, which focuses on the attributes of the organization, is one of four key perspectives around which brand identity is organized. The more attractive the organizational attributes and the more meaningful the associations they create, the more brand equity is enhanced. Given that consumers identify with an organization because its attributes are meaningful, attractive, and similar to their own characteristics or to characteristics that they aspire to have, it stands to reason that an increase in C–C identification through CSR initiatives is likely to enhance brand equity. However, we emphasize that increases in brand equity through CSR initiatives are typically predicated on the use of a cause that resonates with, or at least does not offend, the company's customer base. If customers find that a company is supporting a cause that is inconsistent with their values, the CSR initiative is unlikely to increase brand equity and may even harm it.

Aaker (1996) also asserts that organizational attributes are more enduring and resistant to competitive claims than are product attributes. He argues that it is easier for competitors to copy product attributes than organizational attributes, which in large part are based on people, values, and programs. Inasmuch as CSR initiatives enhance and communicate organizational attributes and increase C–C identification, they may contribute to the creation of a competitive advantage. These effects are likely to be particularly strong for retailers whose company name is, in essence, the brand name and for other companies that use a corporate branding strategy.

Finally, our results suggest that if a company has a poor CSR record, it should choose a nonprofit partner with a cause directly related to the area of criticism, and it should engage in the CSR initiative as part of a genuine effort to change its ways. This speaks to the importance of fit between the firm and the nonprofits with which it may align. This also highlights the importance of a company's ability to position its alliance in a credible way.

Further Research

Although the findings and implications of our studies provide an important extension of previous examinations of C–C identification, they also raise other issues, particularly with respect to the effect on nonprofits. First, we found that nonprofits can benefit from donations from the company's customer base, but do CSR initiatives also increase the probability that customers will support nonprofits in nonmonetary ways, such as by volunteering their time or by supporting political initiatives that benefit the nonprofit? Second, we discovered an important boundary condition related to the willingness of customers to donate to the nonprofit: the degree to which a cause is connected to the dimension on which a company had a poor CSR record. What other boundary conditions may come into play? For example, does the degree to which consumers believe that their donations are likely to have an impact matter? Does the influence that a nonprofit is perceived as having over the issue matter? Do the nonprofit's reputation and/or competencies come into play?

Although we examined C–C identification driven by CSR initiatives, consumers identify with corporations on the basis of other factors as well (e.g., athletes and Nike, bikers and Harley-Davidson). To date, the extent to which identification created in one domain (e.g., athletics) can be leveraged in another (e.g., CSR) is unknown. Thus, it is unclear whether the influence of identification is limited to the basis of that bond or whether it transfers. Research of this nature is likely to provide guidance not only for CSR initiatives but also for other forms of collaborative marketing relationships. In summary, opportunities provided by CSR seem to be vast but complex. The same can be said for further research in the area.

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Appendix
Measurement Scales Used in Studies 1–4

For the following scale descriptions, unless we note otherwise, we developed all scale items, and we measured all items on seven-point scales (1 = "Strongly disagree," and 7 = "Strongly agree") and (re)coded the items such that higher scores reflect higher levels of the constructs

Perceived CSR *(Study 1 $\bar{X}$ = 27 10, range = 5–35, s d = 5 26, α = 90)*

1 (Company name) is committed to using a portion of its profits to help nonprofits
2 (Company name) gives back to the communities in which it does business
3 Local nonprofits benefit from (company name)'s contributions
4 (Company name) integrates charitable contributions into its business activities
5 (Company name) is involved in corporate giving

C–C Identification *(Study 1 $\bar{X}$ = 2 03, range = 0–5, s d = 1 13)*

Consider the following lists of character traits On the left-hand [side of the] list, circle the five that best describe you, on the right-hand [side of the] list, please circle the five that you think best describe (company name)

You (Circle 5)	Company Name (Circle 5)
Committed	Committed
Progressive	Progressive
Community involved	Community involved
Entrepreneurial	Entrepreneurial
Gutsy	Gutsy
Active	Active
Responsible	Responsible
Compassionate	Compassionate
Competitive	Competitive
Free-spirited	Free-spirited
Assertive	Assertiv
Risk taking	Risk taking

Perceptual Corporate Benefits

In Study 1, we measured perceptual corporate benefits as the sum of store loyalty, emotional attachment to the store, and store interest We adopted all of the following measures taken from the work of Hess (1998)

Store Loyalty ($\bar{X}$ = 12 93, range 3–21, s d = 4 89, α = 87)

1 I could easily switch from (company name) to another store (reverse coded)
2 I am a committed shopper at (company name)
3 I feel a sense of loyalty to (company name)

Emotional Attachment to Store ($\bar{X}$ = 17 10, range 4–28, s d = 5 85, α = 85)

1 The emotional reward I get from shopping at (company name) makes it worth it for me
2 Shopping at (company name) gives me a sense of warmth and comfort
3 Shopping at (company name) makes me happy
4 I would experience an emotional loss if I could no longer shop at (company name)

Store Interest ($\bar{X}$ = 3 99, range 1–7, s d = 1 67)

1 I am interested in learning about (company name)

Behavioral Corporate Benefits

Percentage of Shopping at Store (Study 1 [first two and last two categories collapsed] $\bar{X}$ = 2 94, range = 1–5, s d = 1 55)

1 What percentage of your grocery shopping do you normally do at (company name)?
___ less than 10%
___ 10–20%
___ 21–40%
___ 41–60%
___ 61–80%
___ 81–90%
___ 91–100%

CSR Record Manipulation Check *(Study 2/3. $\bar{X}$ = 18 85/18 55, range = 5–35/5–35, s d = 10 59/11 02, α = 98/ 97)*

1 Company X has a strong record on fair labor practices in its overseas manufacturing plants
2 Company X has a strong record of compensating foreign employees fairly
3 Company X has a strong record of providing fair benefit packages for all of its employees
4 Company has a record of not hiring underage children in its overseas manufacturing plants
5 Company X's working conditions in overseas factories are equal to those in U S factories

Nonprofit Domain Perceived Importance *(Study 2/3 $\bar{X}$ = 36 36/36 24, range = 15–42/13–42, s d = 6 60/6 21, α = 93 / 91)*

1 I strongly believe that companies should treat workers in their foreign manufacturing plants as well as they treat workers in their U S manufacturing plants
2 I am committed to the corporate practice of treating workers in foreign and U S manufacturing plants equally well
3 I believe that corporations should monitor their overseas manufacturing operations to make sure their business practices are fair to their workers
4 I believe that corporations have a responsibility to make sure that the working conditions in their overseas manufacturing plants are as good as the working conditions in their U S plants
5 Standing up for fair manufacturing practices in overseas plants is important
6 Corporations will have a better foreign workforce if workers are treated the same as workers in their U S plants

Organization Identification Euclidean Distance Measure *(Study 2/3/4 $\overline{X}$ = 9 28/10 17/9 04, range 3 32–24 25/3 00–21 54/2 83–21 21, s d. = 4 44/4 64/4 21)*

We adopted the organizational identification Euclidean distance measure from the work of Sen and Bhattacharya (2001)

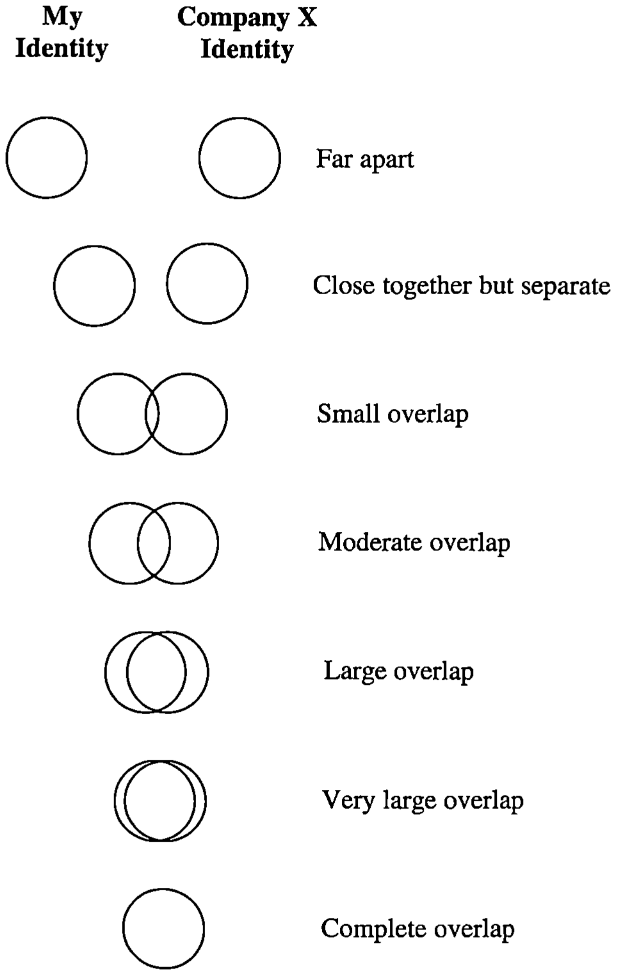
Match 20 self-corporate attribute pairs along dimensions of activist, best, capable, dishonest, innovative, enlightened, a leader, expert, progressive, compassionate, fair, risk averse, conservative, high quality, sincere, cooperative, inconsiderate, sensitive, democratic, and inefficient Format as follows

"Inefficient" accurately describes

Me		**Company X**	
☐ ☐ ☐ ☐ ☐ ☐ ☐		☐ ☐ ☐ ☐ ☐ ☐ ☐	
Strongly Disagree	Strongly Agree	Strongly Disagree	Strongly Agree

Organization Identification Identity Overlap Scale *(Study 2/3/4 $\overline{X}$ = 2 75/2 87/2 89, range 1–7/1–7/1–6, s d = 1 45/1 40/1 38)*

We adopted the organization identification identity overlap scale from the work of Bergami and Bagozzi (2000)



Donation Choice *(0 = donation not chosen/1 = donation chosen, Study 2 = 20/41, Study 3 = 55/37, Study 4 = 74/41)*

Assume that you decided to buy the Model #XP15 calculator from Company X Which button would you click? Please circle one

You Pay the 5% Discounted Price of $123 45 **You Save $6.50**	You Pay the Regular Price of $129 95 **You Donate $6.50** **to Nonprofits**

Corporate Boundary *(Study 3/4 $\overline{X}$ = 9 89/9 83, range = 3–21/3–21, s d = 4 11/4 31, α = 65/ 70)*

1 Corporations are asking too much of consumers if they ask them to donate to charities

2 It is not a corporation's role to give to charities They should pass the savings on to consumers instead and let consumers donate to whatever charities they want

3 If I purchase products from corporations that support charities, I'm doing my part I shouldn't be asked to donate directly to the charities in addition

Donation Probability *(Study 3/4 $\overline{X}$ = 3 98/3 85, range = 1–7/1–7, s d = 2 32/2 45)*

1 If you made the decision to purchase the Model #XP15 calculator from Company X, how likely is it that you would choose to pay the full price whereby you would donate 5% of the purchase price to nonprofits" (1 = "Very unlikely," and 7 = "Very likely")

Frugality *(Study 4 $\overline{X}$ = 3 96, range = 1–7, s d = 2 65)*

For the frugality variable, respondents were asked to state the "extent to which you thought of each of the following factors when you considered whether or not to donate the $6 50 to the charity," on a seven-point scale of 1 = "Did not think about at all," and 7 = "Thought of a lot"

1 I simply do not have the extra money at this stage in my life

Negative Corporate Attributions *(Study 4. $\overline{X}$ = 3 45, range = 1–7, s d = 2 26)*

For the negative corporate attributions variable, respondents were asked to state the "extent to which you thought of each of the following factors when you considered whether or not to donate the $6 50 to the charity," on a seven-point scale of 1 = "Did not think about at all," and 7 = "Thought of a lot"

1 I do not like the way that Company X does business

Nonprofit Domain Importance (Study 4 [labor practices and reading skills] $\bar{X}$ = 17 71/20 99, range = 5–28/4–28, s d = 6 21/5 49, α = 92/ 86)

1 Supporting nonprofits that fight manufacturing sweatshops (help increase the reading skills of U S youths) is important to me

2 I could see myself donating some of my time to supporting nonprofits that help fight manufacturing sweatshops (help increase the reading skills of our youths)

3 Nonprofits that have the goal of fighting manufacturing sweatshops (increasing the reading skills of our youth) make this world a better place to live

4 I can identify with nonprofits that have the goal of fighting manufacturing sweatshops (increasing the reading skills of our youths)

Social Consciousness (Study 4 $\bar{X}$ = 5 29, range = 1–7, s d = 1 38)

1 I consider myself to be a socially conscious person

Behavior Consistent with Core Values (Study 4 $\bar{X}$ = 4 22, range = 1–7, s d = 2 08)

1 The promotion that Company X is considering running is consistent with its core values

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Kwaku Atuahene-Gima & Janet Y. Murray

Antecedents and Outcomes of Marketing Strategy Comprehensiveness

Comprehensiveness has long been recognized as a key feature of marketing strategy decision making However, few studies have examined its antecedents and the conditions under which it influences performance This study attempts to contribute to a better understanding of marketing strategy by investigating project-level antecedents and outcomes of marketing strategy comprehensiveness (MSC) Drawing on contingency and institutional theories perspectives, the authors develop and test the effects of output and process rewards, task conflict, and project members' intra- and extraindustry relationships on MSC They find that whereas process reward and extraindustry relationships are positively related to MSC, task conflict (when combined with conflict avoidance) hinders its development Furthermore, the results indicate that MSC has a more positive effect on performance when implementation speed is higher Finally, the authors discover that technology and market uncertainties differentially moderate the relationship between MSC and performance, the former has a positive effect, and the latter has a negative effect The authors also discuss the theoretical and practical implications of their findings

For several years, marketing scholars have dedicated considerable efforts to understanding the process of marketing strategy development and implementation (Bonoma 1984, Burke 1984, Glazer and Weiss 1993, Menon, Bharadwaj, and Howell 1996, Menon et al 1999, Noble and Mokwa 1999) A key feature of this process is marketing strategy comprehensiveness (MSC), defined as the extent to which project members are extensive and exhaustive in the search for market information, the generation of many alternative courses of action, the examination of multiple explanations, and the use of specific criteria in making decisions in marketing strategy development and implementation Comprehensiveness reflects the structure, rigor, and thoroughness of information search and analysis in marketing strategy decision making (Menon et al 1999) It forces managers into a hypothesis-testing mode (Eisenhardt 1989, p 558), thereby creating new insights that ensure a better understanding of marketing strategy and an increase in managerial confidence in decision making (Day 1994) Therefore, comprehensiveness is a key component of a quality marketing strategy (Menon, Bharadwaj, and Howell 1996) Despite its importance, the antecedents and conditions under which MSC influences performance have yet to be addressed in extant theoretical or empirical research There is a good reason they should be Increasingly, marketing managers go to great lengths and employ several techniques (e g , consideration of obligatory alternatives, fishbowl reviews) (Menon et al 1999) in an attempt to be comprehensive in making a marketing strategy

The purpose of this study is to address this oversight The first research gap concerns the variability in the extent to which firms develop comprehensive marketing strategies Andrews and Smith (1996) study marketing strategy creativity at the individual level and find that the manager's risk-taking propensity, diversity of education, knowledge of the environment, intrinsic motivation, and interaction with others are key antecedents Menon and colleagues (1999) find that innovative culture is positively related to MSC measured at the firm level Although these studies acknowledge that most marketing strategies are formulated and implemented for specific products, they do not focus on the project level Thus, knowledge of the internal and external determinants of MSC at the project level is limited

A second research gap pertains to the relationship between MSC and performance Several studies have examined the direct effects of strategy comprehensiveness on performance and the moderating role of environmental uncertainty at the firm level However, empirical findings have been mixed on both fronts (e g , Fredrickson 1984, Fredrickson and Mitchell 1984, Goll and Rasheed 1997, Priem, Rasheed, and Kotulic 1995) The mixed findings may stem from two causes First, by using the firm as a unit of analysis, previous studies ignore the array of internal and external factors that may influence the effect of a *specific* strategic decision process on performance (Hough and White 2003) Second, previous studies examine environmental uncertainty as a unidimensional construct, thereby

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ignoring the different sources of uncertainty and their potential differential implications for the efficacy of strategy comprehensiveness

Against this backdrop, in this study, we focus specifically on a project level in an attempt to contribute to the marketing literature in three ways First, drawing on contingency theory, we offer explanations for some of the variance in MSC A key argument in contingency theory is that a better understanding of the nature of organizational strategies is gained by examining its antecedents in the form of internal organizational and external environmental factors (Hofer 1975) Given that MSC involves complex information-processing tasks, we focus specifically on factors such as reward systems and task conflict, which affect the information-processing capacity of project members as internal determinants of MSC

Second, we draw on institutional theory to explain that pressures for conformity may influence how internal factors such as task conflict affect MSC and how project members' external relationships act as means by which they acquire external market information in developing MSC Empirical investigation of these issues is extremely important because most previous studies focus on which internal and environmental factors affect marketing strategies (e g , Glazer and Weiss 1993) but pay little attention to the processes by which such factors influence managers in developing or adapting their strategies (Zeithaml, Varadarajan, and Zeithaml 1988, p 40)

Third, we examine the conditions under which MSC influences performance, defined as the extent to which a product, which is the focus of a marketing strategy, has achieved planned sales, market share, and profit objectives Contingency theory also informs this issue by arguing that firms that can adapt their strategies effectively to both internal and external factors are likely to perform better (Hofer 1975, Zeithaml, Varadarajan, and Zeithaml 1988) We argue that given the costs involved in achieving a high level of MSC and possible diminishing returns to its benefits, it is likely that a level of MSC that is either too low or too high may hurt performance, but a moderate level may be optimal This implies that managerial ability to develop a level of MSC that is consistent with organizational resources may determine its success We examine the nonlinear relationship between MSC and performance that is implied by this contingency argument

Scholars have long recognized that strategy implementation plays a potentially important role in the linkage between a marketing strategy and performance (Bonoma 1984, Noble and Mokwa 1999) We contribute to this tradition by investigating the moderating effect of implementation speed Finally, Song and Montoya-Weiss (2001, p 61) argue that "uncertainty should be studied in relation to specific components of the environment in order to properly attribute its effects" Following this insight, we advance the literature by investigating two sources of environmental uncertainty (technology and market uncertainties) in an attempt to uncover their differential moderating effects between MSC and performance Through this richer framework and empirical assessment, we attempt to respond to Menon and colleagues' (1999, p 36) call for research that "examines more complex models of antecedents and outcomes of [marketing strategy making]" Figure 1 presents the conceptual model

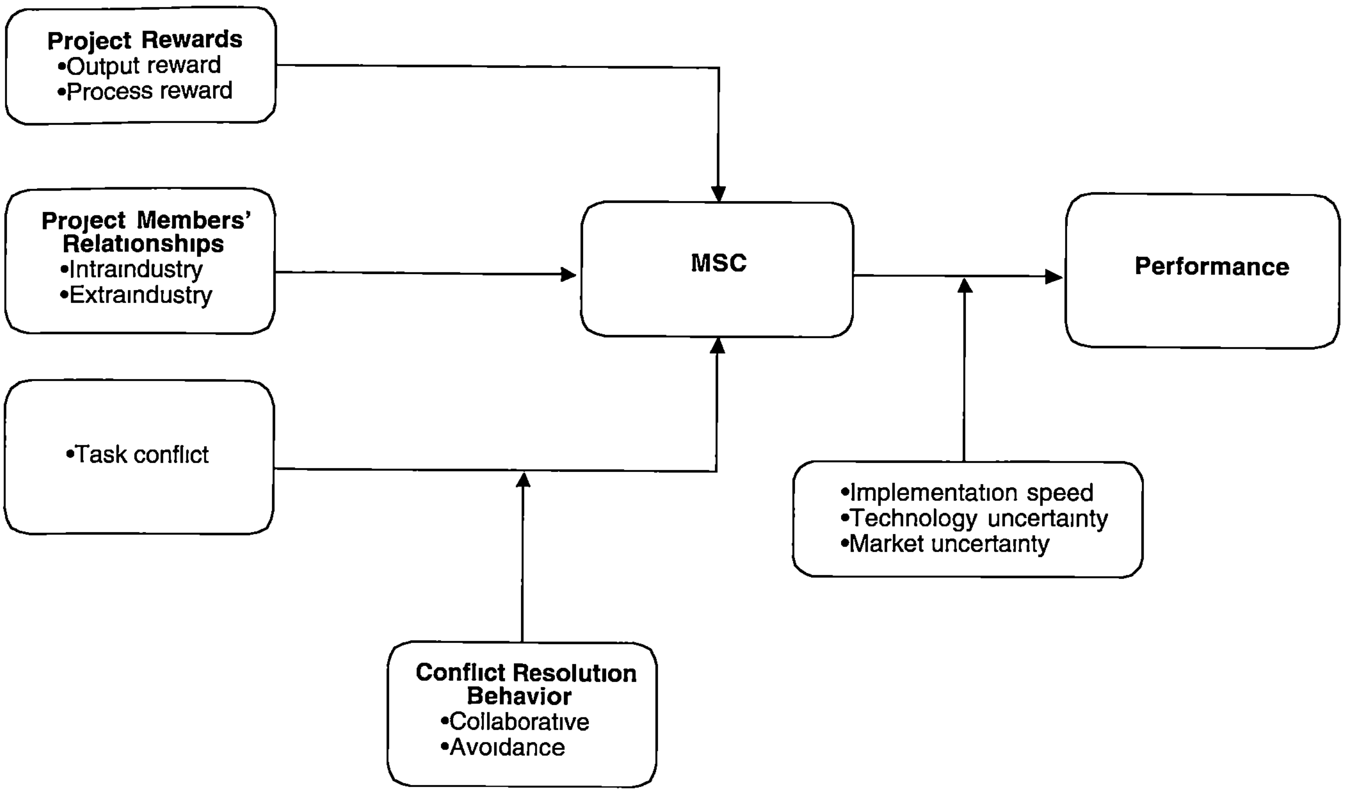
Research Hypotheses

Internal Antecedents of MSC

Drawing on contingency theory (Hofer 1975) and extant marketing strategy research (Andrews and Smith 1996, Burke 1984, Menon et al 1999), we identify internal conditions that influence effective information processing in strategy making as determinants of MSC Market information for strategy making tends to contain tacit components that retard collective interpretation and information sharing Even when market information is made explicit in a codified routine and communicated to project members, some of them may not understand it because they interpret and apply the knowledge in a different functional and experiential context Consequently, market information collection, analysis, and interpretation in marketing strategy making for a specific product is a complex process that involves the understanding of multiple functions (Menon, Bharadwaj, and Howell 1996, Menon et al 1999) For this reason, development of a comprehensive marketing strategy requires internal processes that focus project members' attention on and commitment to effective market information processing (Noble and Mokwa 1999) Two internal processes that are capable of engendering effective generation and sharing of market information in marketing strategy development are reward systems (Burke 1984, Jaworski and Kohli 1993, Ruekert and Walker 1987) and task conflict among project members (Menon, Bharadwaj, and Howell 1996) Noting the potential importance of the former, Menon and colleagues (1999, p 35) call for further research to explore how output- and process-based reward systems influence marketing strategy development We respond to their call in this study

Output reward refers to a process of monitoring and compensating project members for achieving desired performance targets, such as meeting deadlines, budgets, and target market success (e g , sales volume, market share) Output reward provides incentives and responsibilities for results, thereby ensuring that project members eschew politics and commit to the strategy-making process Reduced politics occurs with an increased focus on the content and objectives of the market strategy, whereas commitment occurs with the collective efforts of project members directed toward diverse information collection and in-depth analysis of strategic options (Noble and Mokwa 1999) In addition, output reward shifts performance risk from the organization to the project members because environmental and company factors that may affect the outcome of the marketing strategy are beyond the project members' control (Oliver and Anderson 1994) A key means of attenuating the risks is to increase the quality of strategy with thorough information search and evaluation By allowing autonomy over the means of achieving outcomes, output reward offers an incentive for project members to be comprehensive in attenuating performance risk (Atuahene-Gima and Li 2002)

FIGURE 1
Antecedents and Outcomes of MSC



Process reward is a means of monitoring and compensating project members for completing specified procedures and activities that are critical to achieving desired objectives in marketing strategy development. A key objective of process reward is to ensure thorough market information search and analyses, particularly about customers and competitors at specific stages of the strategy-making process. When rewards are tied to the completion of such process activities, project members believe that they will be rewarded for the quality of their strategies. Thus, process reward increases members' propensity to find and discuss a wider range of marketing strategy options (Menon, Bharadwaj, and Howell 1996, p. 308). A characteristic of MSC is the diversity and extensiveness of search for alternative courses of action, which requires project members to explore beyond the firm's boundary. Because such exploration increases the risk of errors in strategy making, there must be some level of protection for project members. We argue that a process reward establishes a norm of risk sharing between the firm and project members, thereby encouraging them to be expansive and rigorous in marketing strategy making (Atuahene-Gima and Li 2002; Oliver and Anderson 1994). Therefore,

H_1: The greater the (a) output reward and (b) process reward, the greater is the MSC.

The task conflict construct refers to the debate and disagreements among group members about the content, goals, and processes of marketing strategy development (Jehn 1995). Task conflict is a key resource in group decision making because the vigorous debate and disagreements among project members encourage them to gather new data, to delve into issues more deeply, and to gain a more complete and expansive understanding of problems to develop alternative solutions (Jehn 1995; Ruekert and Walker 1987). Despite these benefits, task conflict can be misinterpreted as personal criticism or misconstrued as a challenge to the competence of the project members, particularly by people who are perceived as experts on the issues under discussion (Pelled, Eisenhardt, and Xin 1999). This may limit the expansive and barrier-breaking thinking that is required for comprehensiveness. Institutional theory argues that organizational culture and political processes tend to perpetuate conformity within a firm or group. This suggests that given the tacitness of knowledge and the perceived power of experts, pressures to conform to dominant views and interpretations may render task conflict ineffective in enhancing MSC. On balance, then, the effect of task conflict on MSC is unclear.

Consistent with contingency theory, we posit that the impact of task conflict on MSC may depend on the *conflict resolution strategy* adopted (Ruekert and Walker 1987). Although there are several conflict resolution methods, Song, Xie, and Dyer (2000) suggest that collaboration and avoidance are the ideal and worst types, respectively, and are the types most often adopted by marketing managers. In this study, we focus on collaboration and avoidance for the sake of parsimony. Collaborative conflict resolution refers to the extent to which project members confront conflicts by openly exploring areas of differences and commonality to find integrative solutions that are in the best interests of the strategy-making process Collaborative conflict resolution is likely to enhance the positive effect of task conflict on MSC for two reasons First, it reduces the uncertainties and misattribution associated with task conflict because it ensures that people understand the concerns and perspectives of others This enables project members to concentrate on the content of discussions rather than on personality issues (Song, Xie, and Dyer 2000) Second, collaborative conflict resolution creates a sense of common dependence, thereby enhancing the willingness of project members to share information and to explore strategic options, which in turn enhances MSC

Conflict avoidance refers to the extent to which project members avoid, ignore, or smooth over conflicts Thus, conflict avoidance describes behaviors that minimize conflicts explicitly Conflict avoidance reduces productive interactions among project members and therefore severely limits the timely collection and use of accurate and quality information (Song, Xie, and Dyer 2000) In addition, conflict avoidance inhibits open communication and exchange of quality information because project members focus less on the content of dissenting information and more on the intentions and motivations of the members who provide the information Consequently, project members tend to pursue self-interested motives that limit the scope of exploration of market information and strategic options (Jehn 1995)

H_2 Task conflict has a more positive effect on MSC when collaborative conflict resolution is higher than when it is lower

H_3 Task conflict has a more negative effect on MSC when conflict avoidance is higher than when it is lower

External Antecedents of MSC

Contingency theory also recognizes the importance of external environmental determinants of firm strategy (Hofer 1975) Given their cognitive and resource limitations, decision makers tend to rely on external referents for information and insight into plausible strategic alternatives (Cyert and March 1963) In this respect, institutional theory implies that managers' external ties serve as conduits for information that shape managerial views about the environment and the strategic choices they make The key idea of this theory is that firm strategies and practices are embedded in social relationships and may have a social meaning Consequently, managers are affected by conformity and legitimacy pressures to adopt prevailing strategies (DiMaggio and Powell 1983, Meyer and Rowan 1977) In support of this theory, Geletkanycz and Hambrick (1997) find that managers' external relationships with other managers within and outside their industry influence their propensity to conform to prevailing organizational strategies Given the increasing focus on MSC among marketing managers (Menon et al 1999), this suggests that project members' ties with managers within and outside the firm's industry are antecedents of MSC

Intraindustry relationships are project members' ties with managers in the same industry as the focal firm Through such relationships, project members gain more comprehensive knowledge of industry strategic norms and recipes and more insight into the nature and context of the marketing strategies of other firms This allows for greater diversity of perspectives that enhance members' search and analysis of strategic alternatives Extraindustry relationships are project members' ties with managers outside the focal industry Extraindustry relationships provide project members with an even broader range of information about strategies of firms outside the focal industry (Geletkanycz and Hambrick 1997) Such relationships increase the strategic options considered for selection in marketing strategy making Thus

H_4 The greater the (a) intraindustry relationships and (b) extraindustry relationships of the project members, the greater is the MSC

Performance Effect of MSC

Nonlinear effect A key argument in the extant literature is that strategy comprehensiveness enhances performance because by generating diverse information about the market environment and by identifying the strengths and weaknesses of several strategic options, the firm is in a better position to implement a strategy more effectively (Eisenhardt 1989, p 558, Menon, Bharadwaj, and Howell 1996, p 308, Menon et al 1999, p 26) Although there may be good reasons for this argument, there are also significant costs associated with MSC Indeed, some scholars have argued that given the cognitive limitations and bounded rationality of decision makers, strategy comprehensiveness is nearly impossible because of the high cost and time-consuming processes of information acquisition and analysis (Bahaee 1992) These arguments imply that too much or too little MSC may diminish performance, thus suggesting that it has a positive effect on performance only at a moderate level From a contingency theory perspective, this suggests that managers who are able to determine the level of MSC that reflects their cognitive and other internal resources will derive higher performance from MSC Thus

H_5 There is an inverted U-shaped relationship between MSC and performance, such that at extremely high and low levels its effect on performance is negative, but at moderate levels its effect on performance is positive

Moderating effect of implementation speed Extant research argues that a marketing strategy is more likely to result in better performance when it is implemented successfully (Bonoma 1984, Noble and Mokwa 1999) Although strategy formulation cannot be completely disassociated from its implementation, such a conceptual distinction enables researchers to better identify the discrete, albeit overlapping, aspects of strategy making that in combination may affect performance (Eisenhardt 1989) A key aspect of successful strategy implementation is implementation speed, defined as the pace of activities between the time project members formulate a marketing strategy and the time they fully deploy it in the marketplace Implementation speed captures the acceleration of the decision-making activities from their conception to their implementation Implementation speed may enhance performance by itself because it implies an ability to deal with potential hindrances to the efficacy of a marketing strategy and to ensure first-to-market benefits for a product (Noble and Mokwa 1999) In addition to its potential direct effect on performance, we posit that implementation speed enhances the positive effect of MSC on performance The logic is that the formulation of a comprehensive marketing strategy is inherently a slow process because it takes a lot of time to consider many alternatives, to obtain input from many sources, and to engage in extensive, in-depth analysis Thus, MSC is likely to achieve positive performance effects if project members can implement it speedily Speedy implementation enables the firm to tap quickly into the window of opportunities uncovered by the process of strategy making For example, Eisenhardt (1989) finds that decision making in the most successful companies is simultaneously fast and comprehensive In contrast, slow implementation may exacerbate the costs associated with being comprehensive, thereby diminishing the impact of MSC on performance

H_6 The effect of MSC on performance is more positive when implementation speed is higher than when it is lower

Moderating effect of technology and market sources of uncertainty Technology uncertainty is the speed of change and instability of the technological environment The conventional wisdom is that technology information is highly time sensitive, that is, it becomes obsolete quickly (Weiss and Heide 1993) Such information is believed to be of a dense variety, reflecting a high frequency of unexpected and novel changes, which thus makes it difficult for firms to respond with objective and formal procedures Technology information is also perceived as highly equivocal, which means that it has multiple and ambiguous underlying meanings and causes that defy specific analysis and uniform interpretation (Daft and Macintosh 1981) In addition, technology uncertainty tends to disrupt the balance between project resource needs and available firm resources and skills As Song and Montoya-Weiss (2001) find, technology uncertainty disrupts synergies among project members' resources and skills and synergies needed for effective strategy making This suggests that with the existence of technology uncertainty, MSC is likely to diminish performance

A counterargument is that whereas technological uncertainty is time sensitive, it is nevertheless amenable to effective comprehensive strategic processes because it leads managers to increase their information search efforts (Weiss and Heide 1993) For example, Bourgeois and Eisenhardt (1988) find that successful firms adapt to rapid technological changes by adopting a strategic decision process that involves comprehensive information search and thorough analysis of strategic alternatives The key argument in their findings is that the perceived time sensitivity of technology information is low because the direction of technological change tends to be predictable As Pavitt (1998) shows, technological change tends to progress along defined trajectories, such that firms can recognize and understand the directions of change In this respect, Glazer and Weiss (1993, p 510) also argue that "higher levels of interperiod change that are predictable may not be troublesome" in marketing strategy making This suggests that MSC becomes more important for performance when technology is uncertain, because project members can identify critical decision variables to allow for a more expansive and effective analysis of strategic options These equivocal arguments suggest the following competing hypotheses

H_{7a} Marketing strategy comprehensiveness has a more positive effect on performance when technology uncertainty is higher than when it is lower

H_{7b} Marketing strategy comprehensiveness has a more negative effect on performance when technology uncertainty is higher than when it is lower

Market uncertainty refers to the speed of change in competitor actions and customer needs and preferences (Jaworski and Kohli 1993) Market uncertainty involves significant pace of change, heterogeneity, and unpredictability of customer needs and competitor actions, all of which tend to curtail deliberate and expansive information search efforts and to defy precise and comprehensive analysis (Glazer and Weiss 1993) For this reason, project members require rapid and flexible strategic processes to enhance performance in such an environment Yet MSC is time consuming and less flexible, which suggests that it is of little value to performance when market uncertainty is high, because strategic decisions quickly become irrelevant (Bahaee 1992, p 210) In addition, firms typically collect customer and competitor information by analyzing customers' choice criteria and attribute comparisons of the firm's products with competitors' products (Day and Wensley 1988) Such practices tend to result in institutionalized analyses and responses in strategy making in highly uncertain market environments that diminish performance In support of these arguments, Glazer and Weiss (1993) find that market information is highly time sensitive and is not conducive for obtaining effective MSC outcomes

Although the preceding arguments are persuasive, there is a contrary viewpoint to them Market uncertainty prompts firms to reach out to customers (Li and Calantone 1998), which leads to an enhanced understanding of emerging customer needs and competitor actions (Jaworski and Kohli 1993) This means that market information may be less equivocal to project members and therefore is amenable to specific analysis and interpretation As Daft and Macintosh (1981, p 208) argue, when information is analyzable, use of an objective analytical process in strategy making enhances performance because correct responses can usually be identified In light of these divergent arguments, we posit the following competing hypotheses

H_{8a} Marketing strategy comprehensiveness has a more positive effect on performance when market uncertainty is higher than when it is lower

H_{8b} Marketing strategy comprehensiveness has a more negative effect on performance when market uncertainty is higher than when it is lower

Method

Sample and Data Collection

We drew our sample from a mailing list of U S manufacturing firms that we obtained from Thomson Directory We made telephones calls to identify project managers who met two selection criteria (1) were involved in and (2) were knowledgeable about marketing strategy decision making for the most recent product introduced to market by the firm We identified 393 company informants who met our selection criteria We ensured that the informants were professionally interested, conscientious, and committed to providing accurate data by assuring them of confidentiality and by offering them a summary of the results Subsequent to two follow-up reminders, we received 149 usable questionnaires, for a response rate of 38% Of the sample, 70% of respondents worked in the high-technology industry information technology, computers, and software (20%), electronics and electrical and scientific equipment (20%), pharmaceutical and biotechnology (12%), and automotive components (18%) The rest worked in low-technology industries food (8%), forest, paper, and building products (13%), and other (e g , footwear, clothing) (9%) Following the work of Menon and colleagues (1999), we pooled the data because the analysis of variance test showed that the constructs did not differ significantly ($p > 10$) among the industry groupings The average project size in the sample was 5 66 people (standard deviation [s d] = 3 95) The average market duration for the product (defined as the number of months the product has been offered for sale in the market) was 17 5 months (s d = 15 09) T-test analysis showed no significant differences ($p > 10$) in the study variables between early and late respondents, which suggests that nonresponse bias is not a major concern

Previous studies (e g , Li and Calantone 1998, Menon, Bharadwaj, and Howell 1996, Menon et al 1999) have found that project managers in senior positions, such as chief executive officer, vice president, and marketing manager, are reliable sources of information about marketing strategies Of our project manager informants, 55% listed their job titles as marketing manager, 9% as vice president of marketing, 11% as product manager, 17% as chief executive officer, and 8% as engineering manager The average work experience of informants in their firms was 9 95 years Their degree of involvement and knowledge about the marketing strategy on a ten-point scale (see Conant, Mokwa, and Varadarajan 1990) was a high 8 89 These characteristics of the informants imply that they had the knowledge and confidence to respond to the issues under study

Measures of Constructs and Validity

Table 1 presents the measures and their sources We pretested the instrument in interviews with 35 part-time MBA students who had a minimum of three years of business experience We obtained feedback that pertained mainly to ambiguities or difficulties in responding to the items and suggestions for adaptations to ensure the clarity and appropriateness of items We revised the instrument accordingly We defined marketing strategy development as involving the determination of decisions (e g , product design, development, promotion, pricing, distribution) that require large resource commitments and long time horizons and are difficult to reverse in the short run

We measured performance ($\alpha = 84$) with three items by asking respondents to indicate the extent to which the product has achieved its sales, market share, and profit objectives since its launch We also asked respondents to indicate on a single item the degree to which the overall performance of the product has met management expectations (1 = "well below expectations," and 10 = "well above expectations") These two measures have a high correlation of 72 ($p < 001$), which suggests that there is convergent validity We measured MSC ($\alpha = 91$) with five items by asking informants to rate, for example, the extent and depth of the search for strategic alternatives We measured output reward ($\alpha = 89$) with four items by asking informants to indicate the degree to which rewards for project members were based, for example, entirely on performance outcomes We measured process reward ($\alpha = 87$) with four items by asking informants, for example, the degree to which rewards were based on the quality of strategic decisions

We measured task conflict ($\alpha = 88$) with five items that tapped the degree of disagreements among project members about ideas, goals, and processes adopted in the strategy-making process We measured collaborative conflict resolution ($\alpha = 81$) with four items that examined the degree to which the project members confronted and collaborated to resolve conflicts in the strategy-making process Similarly, we measured conflict avoidance ($\alpha = 72$) with four items that reflected the extent to which the project members reframed from confronting the conflicts We captured intraindustry relationships ($\alpha = 88$) and extraindustry relationships ($\alpha = 96$) with four new items based on Geletkanycz and Hambrick's (1997) conceptual descriptions and project members' contacts with managers within and outside the industry, respectively

We measured implementation speed ($\alpha = 78$) with four new items that tapped the degree to which the strategy implementation was timely and faster than the planned schedule We measured technology uncertainty ($\alpha = 90$) with four items that pertained to the unpredictability of changes in technology and the rate of product introductions The five items measuring market uncertainty ($\alpha = 75$) reflected the speed of change of customer demand and competitor actions

We controlled for several variables We used firm size, measured by the number of employees, to control for greater complexity and economies of scale in large firms in strategy making We used project size, measured by the number of people who have significant influence in marketing strategy decision making, to control for interaction dynamics that affect performance of groups We coded industry as high technology (1) and low technology (0) We included product advantage ($\alpha = 73$) (measured with three items that reflected the quality of the product, compared with competitors' products and previous products of the firm) and market duration of the product (measured by the number of months the product has been on the market) because each is a likely antecedent of performance

We sought to control for common method bias by encouraging respondents to seek multiple responses to the questionnaire A t-test analysis indicated no significant differences for all the study variables between the 20% of questionnaires completed by multiple informants and the 80% of questionnaires completed by single informants We

TABLE 1
Confirmatory Factor Analysis Results of Measures

Measures and Sources	Description	Standardized Factor Loading	t-Value
Performance CR = 80 AVE = 68 (Atuahene-Gima 1995)	To what extent have the objectives for marketing the product been achieved with respect to		
	•Sales	85	12 34
	•Market share	78	10 53
	•Profit	87	13 01
MSC CR = 89 AVE = 79 (Menon et al 1999)	During the marketing strategy development process (product and associated marketing strategies), to what extent did the project members		
	•Develop many alternative courses of action to achieve the intended objectives?	88	12 80
	•Conduct multiple examinations of any suggested course of action the project members wanted to take?	82	11 04
	•Thoroughly examine multiple explanations for the problems faced and for the opportunities available?	81	10 96
	•Search extensively for possible alternative courses of action to take advantage of the opportunities?	78	9 50
	•Consider many different criteria before deciding on which possible courses of action to take to achieve your intended objectives?	79	9 88
Output reward CR = 89 AVE = 68 (Atuahene-Gima and Li 2002)	To what extent do you agree with the following statements about the process of rewarding project members?		
	•Rewards to project members were entirely related to achievement of performance objectives for project activities	84	10 44
	•Rewards for project members were entirely based on final outputs achieved	81	9 56
	•The project members' rewards depended upon the market performance of the product	79	8 45
	•In rewarding the project members, primary weight was placed on objective criteria such as results achieved	76	7 86
Process reward CR = 83 AVE = 59 (Atuahene-Gima and Li 2002)	To what extent do you agree with the following statements about the process of rewarding team members?		
	•Rewards to project members were based on subjective criteria such as attributes of the product	76	7 89
	•Rewards to project members were based on effectiveness of implementation of the strategy rather than results	75	7 70
	•The rewards depended entirely on the quality of strategic decisions made rather than results	66	6 66
	•Project members were rewarded for completing major stages in the marketing strategy development process	65	6 06
Task conflict CR = 89 AVE = 69 (Menon, Bharadwaj, and Howell 1996, Pelled, Eisenhardt, and Xin 1999)	To what extent did project members in the marketing strategy development disagree with each other about		
	•Ideas concerning the best way to maximize the effectiveness of the marketing strategy	65	7 60
	•Ideas concerning the different goal priorities for the marketing strategy	75	8 86
	•The best way to ensure the success of the strategy	73	8 82
	•Which marketing objectives should be considered more important	62	7 25
	•Different approaches for developing and implementing the strategy	85	11 18
Collaborative conflict behavior CR = 82 AVE = 55 (Jehn 1995, Song, Xie, and Dyer 2000)	When conflicts arose among project members during the marketing strategy development process		
	•We tried to exchange complete and accurate information to resolve them	77	10 12
	•We played down our differences and emphasized our common interests	47	5 69
	•We engaged in genuine collaborative effort to resolve them	82	11 29
	•We discussed them, focusing on the common goals of the strategy	85	12 15
Conflict avoidance behavior CR = 73 AVE = 41 (Jehn 1995, Song, Xie, and Dyer 2000)	When conflict arose among project members during the marketing strategy development process		
	•We refrained from arguments about the issues	42	4 63
	•We avoided the issues altogether	65	7 60
	•We tried to stay away from any disagreements	75	8 86
	•Our disagreements were swept under the carpet	72	8 47

TABLE 1
Continued

Measures and Sources	Description	Standardized Factor Loading	t-Value
Implementation speed CR = 75 AVE = 44 (New scale)	To what extent do you agree with the following statements about implementing the market strategy?		
	•The implementation was faster than in other previous strategies	75	8 73
	•The implementation was much faster than our planned schedule required	69	7 70
	•The strategy was implemented in a shorter time than expected	57	6 08
	•Speed of implementation of the strategy was a critical concern of the project members	66	7 00
Product advantage CR = 74 AVE = 50 (Atuahene-Gima 1995)	To what extent do you agree or disagree with the following statements about the product?		
	•Quality of the product compared well with competitor products	78	9 55
	•The product was of higher quality than competing products	59	6 17
	•Quality of the product compares well with others we have developed in the past	83	10 21
Market uncertainty CR = 72 AVE = 37 (Jaworski and Kohli 1993)	Indicate your degree of agreement about how well these statements describe the market environment for the product		
	•Competitor activities in the market are quite uncertain	40	4 80
	•The product-market has many new competitors	45	5 26
	•The product-market competitive conditions are highly unpredictable	52	5 88
	•Customers' preferences change quite rapidly	77	7 22
	•Customers' needs in our industry are changing quite rapidly	85	7 98
Technological uncertainty CR = 88 AVE = 65 (Jaworski and Kohli 1993)	Indicate your degree of agreement about how well these statements describe the technological environment for the product		
	•The technology in the market environment was changing rapidly	78	10 55
	•Technological changes provide big opportunities in the industry	63	7 87
	•A large number of new product ideas have been made possible through technological breakthroughs in the industry	81	11 11
	•There are major technological developments in the industry	94	14 53
Intraindustry relationships CR = 84 AVE = 62 (New scale)	To what extent do you agree with the following statements about your project members during the market strategy development?		
	•Project members communicated frequently with knowledgeable executives within our industry	59	8 33
	•Project members had close interactions with knowledgeable people about conditions in our industry	64	8 55
	•Project members received a lot of information from other executives within our industry	84	12 46
	•Project members received advice about the project from knowledgeable people within our industry	74	10 37
Extraindustry relationships CR = 92 AVE = 71 (New scale)	To what extent do you agree with the following statements about your project members during the marketing strategy development?		
	•Project members put a lot of effort into communicating with knowledgeable people outside our industry	70	9 23
	•Project members maintained close contacts with knowledgeable people in firms outside our industry	84	11 18
	•Project members learned a lot from knowledgeable people in firms not operating in our industry	71	9 30
	•Project members received useful information from knowledgeable people outside our industry	81	10 89

Notes We measured all items on a five-point scale (1 = "No extent," and 5 = "To a great extent"), except for performance, which we measured on a five-point scale where 1 = "Strongly disagree," and 5 = "Strongly agree "

conducted a statistical check for common method variance with the Harman one-factor method (Podsakoff and Organ 1986) If common method bias is a serious problem, a single factor should emerge or one general factor should account for most of the variance A principal components factor analysis of all measures yielded 13 factors with eigenvalues greater than 1 0, with total explained variance of 73% Because several factors were uncovered and the first factor accounted for only 15% of the variance, common method bias may not be a serious problem (Menon et al 1999, p 31) Finally, we tested several interaction effects that could not be explained by common method bias because informants could not have guessed the complex relationships involved (Aiken and West 1991, Evans 1985)

In a confirmatory factor analysis, each measure loaded significantly on the expected constructs, which demonstrates convergent validity Together, the factor loadings and model fit indexes (goodness-of-fit index = 89, root mean square error of approximation = 06, comparative fit index = 91, and nonnormed fit index = 93) presented in Table 1 suggest that the model fit is acceptable Table 2 reveals that the diagonal elements representing the square roots of the average variance extracted (AVE) for each of the constructs are greater than the off-diagonal elements, which satisfies the criterion of discriminant validity (Fornell and Larcker 1981, Sakar, Echambadi, and Harrison 2001) Finally, the constructs' previously reported alpha and the composite reliabilities (CRs) presented in Table 2 indicate that each exceeded the accepted reliability threshold of 70 Table 2 presents the correlations and descriptive statistics of the constructs We used the average score of measures of each construct for further analysis

Analysis and Results

Model Specification and Estimation

$$\begin{aligned}(1)\quad \text{MSC} = {} & \alpha_0 + \alpha_1(\text{OUTR}) + \alpha_2(\text{PROR}) \\ & + \alpha_3(\text{TASKC}) + \alpha_4(\text{COLLA}) + \alpha_5(\text{AVOID}) \\ & + \alpha_6(\text{INTRA}) + \alpha_7(\text{EXTRA}) + \alpha_8(\text{TASKC} \times \text{COLLA}) \\ & + \alpha_9(\text{TASKC} \times \text{AVOID}) + \alpha_{10}(\text{CON}_{1-4}) + \varepsilon_1, \text{ and}\end{aligned}$$

$$\begin{aligned}(2)\quad \text{PDPERF} = {} & \beta_0 + \beta_1(\text{MSC}) + \beta_2(\text{IMPSD}) + \beta_3(\text{MKTUN}) \\ & + \beta_4(\text{TEKUN}) + \beta_5(\text{MSCSQ}) \\ & + \beta_6(\text{MSC} \times \text{IMSPD}) + \beta_7(\text{MSC} \times \text{MKTUN}) \\ & + \beta_8(\text{MSC} \times \text{TEKUN}) + \beta_9(\text{CON}_{1-12}) + \varepsilon_2,\end{aligned}$$

where

MSCSQ = squared term for marketing strategy comprehensiveness,
OUTR = output reward,
PROR = process reward,
TASKC = task conflict,
COLLA = collaborative conflict resolution,
AVOID = conflict avoidance,
INTRA = intraindustry relationships,
EXTRA = extraindustry relationships,
PDPERF = performance,
IMPSD = implementation speed,
MKTUN = market uncertainty,
TEKUN = technology uncertainty, and
CON = control variables

As Aiken and West (1991) recommend, we mean-centered relevant variables before we created the interaction terms The variance inflation factors in the regression models were all less than 2, which indicates that multicollinearity is not a serious problem Table 3 contains the results

Model 1 in Table 3 tests the effects of the control variables on MSC Model 2 adds the main effects of the antecedent variables, which contribute 42% (ΔF = 12 82, $p <$ 001) more than the variance explained by the control variables The addition of the interaction terms in Model 3 added 3% (ΔF = 2 60, $p <$ 01) to the explained variance obtained in Model 2 H_{1a}, which predicts that output reward is positively related to MSC, is not supported Process reward is positively related to MSC, in support of H_{1b} (α = 24, $p <$ 01) H_2, which suggests that the relationship between task conflict and MSC is more positive when collaborative conflict resolution is higher than when it is lower, is not supported Rather, the results show that collaborative conflict resolution is a positive predictor of MSC (α = 15, $p <$ 05) H_3 is supported because the relationship between task conflict and MSC is more negative when conflict avoidance is higher than when it is lower (α = – 16, $p <$ 01) H_{4a}, which posits a positive link between intraindustry relationship and MSC, is not supported The link between extraindustry relationship and MSC is positive (α = 36, $p <$ 001), in support of H_{4b}

Model 4 in Table 3 reports the main effects of the control variables on performance Note that in this model, we also controlled for process and output rewards (Atuahene-Gima and Li 2002), intra- and extraindustry relationships (Geletkanycz and Hambrick 1997), and task conflict and conflict resolution methods (Jehn 1995) because previous studies suggest that they can influence performance Model 5 adds the main effects of the antecedent variables, which contribute 5% (ΔF = 1 73, $p <$ 10) more than the variance explained by the control variables Model 6 adds the squared term for MSC and the interaction terms These variables increased explained variance by 8% (ΔF = 2 92, $p <$ 01) more than the explained variance we obtained in Model 5 The data do not support H_5, which predicts a nonlinear relationship between MSC and performance (β = 07, not significant) In support of H_6, the data in Model 6 show that MSC has a more positive effect on performance when implementation speed is higher than when it is lower (β = 24, $p <$ 001) H_{7a} is supported because the relationship between MSC and performance is positively moderated by technology uncertainty (β = 18, $p <$ 05) H_{8b} is supported because market uncertainty negatively moderates the effect of MSC on performance (β = – 23, $p <$ 01) Regarding the control variables, product advantage (β = 38, $p <$ 001) and task conflict (β = 16, $p <$ 10) are positively related to performance

Discussion

This study examines the antecedents and conditions under which MSC affects performance at the project level The results suggest that by rewarding process activities in marketing strategy development, managers provide significant incentives for project members to broaden the search for strategic alternatives and to deepen their analysis in marketing strategy development This finding builds on Menon, Bharadwaj, and Howell's (1996) finding that formalization is important for developing quality marketing strategy It also provides evidence that formalized reward systems

TABLE 2
Correlation Matrix and Descriptive Statistics of Measures

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Performance	82[a]																
2 MSC	21*	89															
3 Process reward	05	34**	77														
4 Output reward	18*	18*	24**	82													
5 Intraindustry relationships	03	21*	15	– 01	84												
6 Extraindustry relationships	11	44**	09	04	22**	78											
7 Task conflict	11	36**	26**	02	11	28**	69										
8 Collaborative conflict resolution	16	23**	16*	14	04	04	– 00	74									
9 Conflict avoidance behavior	– 11	– 20*	– 01	– 24**	– 04	01	– 01	– 18*	64								
10 Implementation speed	– 10	14	18*	45**	05	03	22**	31**	– 08	66							
11 Technology uncertainty	01	00	20*	07	02	09	22**	– 08	06	01	81						
12 Market uncertainty	14	05	08	14	– 03	06	35**	– 11	12	16	45**	61					
13 Product advantage	43**	24**	22**	34**	13	11	– 07	38**	– 18*	31**	– 02	– 03	71				
14 Market duration of product	– 06	– 12	– 11	– 02	00	– 06	– 10	13	– 12	– 04	– 13	– 23**	– 04	N A			
15 Project size	07	05	07	– 01	– 03	01	12	13*	– 12	20*	06	– 02	01	20*	N A		
16 Firm size	08	04	05	02	– 02	08	16	06	– 02	10	14	13	08	– 02	01	N A	
17 Industry dummy	07	– 02	– 13	15	03	11	– 09	11	– 04	10	25**	– 00	16*	– 03	– 10	06	N A
Mean	3 45	2 92	2 34	2 81	2 88	2 24	2 84	3 71	2 26	2 97	3 32	2 85	3 68	17 54	5 66	401 15	65
S D	91	88	86	1 03	1 05	1 06	85	75	85	86	1 10	79	77	15 09	3 95	223 64	35

*$p < 05$
**$p < 01$
[a] Figures on the diagonal are square roots of AVE N A = not applicable

TABLE 3
Results of Regression Analysis of Antecedents and Outcomes of MSC

Variables	Hypotheses	MSC			Performance		
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Controls and Direct Effects							
Project size		04 (46)	01 (19)	01 (13)	05 (59)	10 (1 08)	08 (87)
Firm size		– 02 (– 32)	– 05 (– 70)	– 04 (– 54)	03 (– 33)	03 (35)	05 (52)
Industry dummy		– 04 (– 49)	– 08 (–1 06)	– 06 (– 85)	05 (60)	05 (57)	05 (59)
Product advantage					42 (4 12)***	44 (4 28)***	38 (3 67)***
Market duration of product					– 09 (–1 07)	– 09 (–1 03)	– 10 (–1 17)
Technology uncertainty		– 06 (– 57)	– 11 (–1 44)	– 10 (–1 20)		– 09 (– 89)	– 05 (– 47)
Market uncertainty		09 (92)	06 (68)	06 (77)		18 (1 74)*	10 (93)
Output reward	H_{1a}		05 (64)	04 (47)	01 (13)	07 (71)	13 (1 22)
Process reward	H_{1b}		26 (3 53)***	24 (3 24)**	– 07 (– 82)	– 07 (– 72)	– 14 (–1 39)
Task conflict			19 (2 35)**	17 (2 08)**	15 (1 53)†	13 (1 27)	16 (1 55)†
Collaborative conflict resolution behavior			16 (2 22)**	15 (2 05)*	04 (39)	10 (99)	14 (1 39)
Conflict avoidance behavior			– 16 (–2 16)**	– 18 (–2 43)**	– 02 (– 17)	– 01 (– 13)	– 02 (– 20)
Intraindustry relationships	H_{4a}		05 (72)	06 (86)	– 06 (– 66)	– 05 (– 56)	– 03 (– 29)
Extraindustry relationships	H_{4b}		39 (5 21)***	36 (4 82)***	02 (19)	01 (14)	02 (17)
Implementation speed						– 21 (–1 99)**	– 20 (–1 94)*
MSC						01 (05)	00 (03)
Relevant Interaction Effects							
Task conflict × collaborative conflict resolution behavior	H_2			02 (24)			
Task conflict × conflict avoidance behavior	H_3			– 16 (–2 26)**			
MSC^2	H_5						07 (71)
MSC × implementation speed	H_6						24 (2 77)***
MSC × technology uncertainty	H_{7a} H_{7b}						18 (1 81)*
MSC × market uncertainty	H_{8a} H_{8b}						– 23 (–2 11)**
R^2		01	43	46	22	27	34
Adjusted R^2		00	38	39	13	16	21
F–value		20	7 70***	7 14***	2 58**	2 42**	2 66***
ΔR^2			42	03		05	08
Partial F-value			12 82***	2 60**		1 73†	2 92**
N		135	135	135	131	131	131

†p < 10
*p < 05
**p < 01
***p < 001

Notes We report standardized regression coefficients (t-values are in parentheses) Reduced sample size for Models 4–6 is the result of the deletion of outlier cases enhance strategy comprehensiveness (Fredrickson 1986) A key finding is that the positive effect of task conflict on MSC is completely buffered by conflict avoidance, such that it becomes negative It appears that open debate, diversity of opinions, and interpretations of market information can often generate adverse reactions from people whose views are criticized (Jehn 1995) The avoidance of such conflicts stifles the positive effect of task conflict on MSC It is surprising that the collaborative conflict resolution method does not moderate the link between task conflict and MSC, as we predicted These findings suggest that conflict avoidance and collaborative conflict resolution methods are related phenomena but are not opposite ends of the same spectrum

Extraindustry relationships, but not intraindustry relationships, significantly enhance MSC By having extraindustry relationships, project members gain exposure to diverse information and perspectives, which help in the discovery and analysis of diverse alternative strategic options Contrary to our expectations, intraindustry relationships have no relationship with MSC A possible reason for this finding is that such relationships tend to limit project members' capacity to envision multiple and different strategic alternatives in marketing strategy making Together, the findings illuminate the enhanced insights that can accrue from combining both contingency and institutional theories as an explanatory platform for MSC

The results on the contingent relationship between MSC and performance advance the literature on three fronts First, we bring some clarity into the literature by showing that the relationship between MSC and performance is not concave Indeed, MSC has no significant, direct effect on performance in this sample Second, MSC has a positive effect on performance when it is combined with implementation speed Implementation speed, by itself, is negatively related to performance This finding could suggest that because it is a slow process, MSC and implementation speed are contradictory, such that extreme comprehensiveness may have a strong dilutive effect on the benefits of speedy implementation It is also possible that a firm has a relatively slow strategy development process but speeds up its implementation process to market a product quickly, thereby enhancing performance (Eisenhardt 1989)

We explored these arguments in a *post hoc* analysis We created a typology of four groups of firms using the median split method and compared them using analysis of variance Firms with high MSC and implementation speed (49 firms) had significantly higher performance mean scores (3 97) than did firms with low MSC and high speed (3 41) (38 firms), which in turn had higher mean scores than firms with high MSC and low speed (2 98) (32 firms), which in turn did not differ from the 18 firms that had low MSC and low speed (2 56) ($F = 7\ 79$, $p <\ 01$) The results suggest that though MSC is important, it must be implemented speedily to achieve positive performance effects, which reinforces the importance of strategy implementation in extant marketing strategy research (Noble and Mokwa 1999)

Third, on the premise that technology and market uncertainties may have different implications for the effect of marketing strategy making on performance, we examined their differential moderating effects Technology uncertainty positively moderates the effect of MSC on performance, in support of the argument that it provides a more conducive environment for MSC because the direction of change may be recognizable That is, the time sensitivity of technology information may be low and therefore amenable to systematic analysis and comprehension (Pavitt 1998) The argument that technology information is unsuited for effective MSC is therefore not supported by our data In contrast, MSC diminishes performance when market uncertainty is high This lends support to the view that market information is highly time sensitive and that strategy making requires more real-time information flow than can be provided through a formal, comprehensive process (Glazer and Weiss 1993)

In summary, our study provides empirical support for the argument that components of the environment differ in their perceived time sensitivity and information-processing demands on project members in marketing strategy making This extends the work of Glazer and Weiss (1993) and indicates the perils of a simple categorization of the environment into certain and uncertain Our study suggests that if distinctions are not made among sources of uncertainty, insights into the complexity of the moderating effect of environmental uncertainty on the relationship between MSC and performance may be obscured

Managerial Implications

The findings of our study suggest that to engender MSC, managers must reward project members for adherence to specific processes that ensure rigor and thoroughness in information collection and analysis In addition, managers should encourage project members to cultivate relationships with people outside their own industries to gain both new insights and an expanded perspective in marketing strategy development This could involve a provision of specific training and resources that enhance the external relationships of project members Finally, managers must note that avoiding conflicts that result from task disagreements may hurt the level of MSC

The results of this study also caution managers that an unquestionable positive view may be too simplistic, because its impact on performance is moderated by both internal and external factors Specifically, the study suggests the need for managers to pay more attention to enhancing their firm's strategy implementation capability, because speedy implementation appears to alleviate the costs of the inherent slowness of MSC The differential moderating effects of technology and market uncertainties suggest to managers that these sources of uncertainties create different information-processing demands in strategic decision making Therefore, managers must understand the nature of the information-processing expertise required under each environmental condition in undertaking MSC to increase its performance effects These findings underscore the need for managers to be more proactive in training project members to acquire the appropriate information-processing skills for marketing strategy making

Limitations and Directions for Further Research

This study has some limitations First, although we followed previous research (Li and Calantone 1998, Menon, Bharadwaj, and Howell 1996, Menon et al 1999) in using a single, knowledgeable project manager who held a senior-level position as our informant, the results may be subject to single-informant bias A reasonable argument can be made that such senior managers' knowledge about a marketing strategy may be of a summary, top-line nature and likely reflects a positive bias Further research that uses middle managers as informants would help clarify whether the results reported herein are sensitive to key informants' level of seniority

Second, because the focus of our study was MSC at the project level, it cannot speak directly to the contradictory findings reported by studies of MSC at the firm level However, we believe that future studies that test the thrust of our theoretical model at the firm level can provide a means for resolving the previous discordant findings Third, although objective performance measures would have been more desirable, they are usually unavailable at the project level However, we note that subjective measures of performance continue to be useful in studies of marketing strategy development (e g , Menon, Bharadwaj, and Howell 1996, Menon et al 1999) and may provide the best option given differences in the nature of industries, time horizons, economic conditions, and goals of the sample firms Finally, the generalizability of the findings is limited because our sample is not representative of U S firms

In addition to alleviating the limitations of this study, there are other fertile avenues for further research in this domain First, further research should examine other project-level antecedents because we explained only 46% of the variance in MSC Second, we find that collaborative conflict resolution does not moderate the effect of task conflict on MSC Xie, Song, and Stringfellow (1998) identify several other conflict resolution methods, such as competition, accommodation, compromise, and hierarchical methods The extent to which such methods moderate the effect of task conflict on MSC should be examined in further research Third, our study examined intra- and extraindustry relationships with a specific focus on managers However, consultants, suppliers, and customers may be sources of input into marketing strategy development Studying project members' relationships with these external constituents will enrich the understanding of how MSC emerges

Fourth, future researchers should further explore the internal and external conditions under which MSC affects other performance outcomes In particular, implementation factors such as strategic and role commitment (Noble and Mokwa 1999) and cross-functional integration (Menon et al 1999) require investigation Fifth, although several previous studies have reported differential moderating effects of sources of uncertainty in the relationship between marketing strategy and performance (e g , Atuahene-Gima 1995, Glazer and Weiss 1993, Jaworski and Kohli 1993, Weiss and Heide 1993), few have offered a theoretical rationale for the observed differences Given the importance of environmental uncertainty to the understanding of marketing phenomena, our distinction between the differential moderating roles of technology and market uncertainties is a valuable addition to the literature The theoretical differences advanced herein hold promise for further research that examines how marketing strategy and other marketing capabilities are influenced differentially by these and other sources of uncertainty

Finally, some scholars would argue that our description of MSC is an incomplete view of the reality of strategic decision making because it fails to recognize the cognitive limitations of managers and their resource limitations in searching for and interpreting information (Bahaee 1992, Cyert and March 1963) Such scholars would point to incremental decision making that involves experienced-based mental routines that produce answers automatically without apparent formal information search and evaluation Further research should examine the determinants and outcomes of such decision-making processes in marketing strategy making

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Ashwin W. Joshi & Sanjay Sharma

Customer Knowledge Development: Antecedents and Impact on New Product Performance

By enhancing the fit between new product features and customer preferences, the customer knowledge development process fosters new product success Despite this significant benefit, there is considerable variance in the extent to which firms engage in this process in their new product development projects This is because not all firms can meet the resource, strategic flexibility, and motivational requirements of the process In this research, the authors develop a nomological network wherein they identify (1) the organizational actions that enable effective implementation of the customer knowledge development process, (2) the characteristics of new product development projects that moderate the effects of these actions, and (3) the outcomes that are generated by the process The results from a survey of 165 marketing managers who had recently participated in new product development projects provide substantial support for the nomological network The authors explore the theoretical and managerial implications that arise from their results and provide future research directions

The failure rate of new products is somewhere between 40 and 75% (Stevens and Burley 2003) Given the high costs associated with new product development, minimization of the high failure rate is a topic of considerable theoretical and managerial interest Customer knowledge development—that is, the development of an understanding of customer preferences—has been identified as a key prerequisite for new product success (Cooper and Kleinschmidt 1995, 1996) Despite the acknowledged importance of customer knowledge development in fostering new product success (e g , Nonaka and Takeuchi 1995), there is considerable variance in the extent to which firms engage in this process in their new product development projects (Cooper 1998) In this research, we identify the underlying reasons for this variance

We observed three key limitations in prior literature on customer knowledge development in new product development projects First, although there is a general understanding that customer knowledge development occurs through a bilateral process of firm–customer interaction across the various stages of new product development (Leonard 1998, Prahalad and Ramaswamy 2004), this understanding has not been formalized in terms of a theoretical construct It is essential to develop a formal conceptualization of the process of customer knowledge development to build the systematic body of empirical research that is necessary to advance the understanding of this process

The process of customer knowledge development unfolds in an organizational context and, more immediately, in the context of a specific new product development project As such, these contexts have an important role to play in determining the effectiveness of the process (Dougherty 1992, Dougherty and Hardy 1996, Dougherty and Heller 1994) The second limitation of prior research on customer knowledge development in new product development projects is that specific organizational actions that can foster customer knowledge development have not been identified, to the best of our knowledge Furthermore, the extent to which project characteristics can enhance or mitigate (i e , moderate) the impact of organizational actions on customer knowledge development is not known This lack of attention to the interrelated impact of different organizational factors on new product development activities is also a general limitation in the new product development literature (Henard and Szymanski 2001)

Third, because much of the knowledge about customer knowledge development is grounded in case studies, large-scale empirical evidence for its antecedents, moderators, and effects on new product performance is lacking

Accordingly, our objectives in this research are to

1 Develop a formal construct to reflect customer knowledge development as a process that occurs across the new product development stages,
2 Develop a nomological network that comprises the antecedents, moderators, and outcomes of customer knowledge development, and
3 Provide an empirical test for this nomological network in a large-scale survey-based setting

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We begin by defining customer knowledge development and by articulating our conceptual framework We then elucidate the methods and measures we used to test the framework Following presentation of the results, we close with a discussion of the results in terms of their theoretical, managerial, and further research implications

Conceptual Framework

Customer Knowledge Development

New product development projects comprise two main phases prelaunch and postlaunch Learning about customer preferences (i e , customer knowledge development) occurs in both phases but entails lower costs and lower strategic risk in the prelaunch phase (Cooper 1998) Accordingly, we focus on customer knowledge development in the prelaunch phase of new product development The prelaunch phase includes the following stages idea generation, concept refinement, product development, and product testing (Troy, Szymanski, and Varadarajan 1982)

As we noted previously, an understanding of customer preferences is essential to the creation of successful new products Recent research on customer new product preference formation suggests that rather than being a preexisting state that directs the course of the new product development project, such preferences evolve through customer engagement with specific new product ideas, concepts, and prototypes across the stages of new product development (Hamel and Prahalad 1991, 1994) Accordingly, to develop an understanding of evolving customer new product preferences, it is necessary for customer knowledge development to be an evolutionary process

As an evolutionary process, customer knowledge development has three defining characteristics (1) It is ongoing in the prelaunch stages of new product development, (2) it is emergent in that novelty at each stage (e g , idea generation, concept refinement) arises from customer interaction, and (3) it entails an action-based, trial-and-error mode of organizational learning about customer preferences (Huber 1991, Lynn, Morone, and Paulson 1996, Miner, Bassoff, and Moorman 2001, Van de Ven and Polley 1992)

On the basis of the preceding, we formally define customer knowledge development as a process of developing an understanding of customer new product preferences that unfolds through the iteration of probing and learning activities (Lynn, Morone, and Paulson 1996) across stages of the prelaunch phase of new product development Probing activities include the deployment of new product ideas, concepts, and prototypes among target customers, and learning activities entail the analysis of customer feedback and the development of subsequent probes based on the analysis (Hargadon and Sutton 2000, Leonard 1998)

Given that customer knowledge development occurs in an organizational context in general and in the context of a specific new product development project in particular, we expect that these contexts have a significant influence on this activity In the following discussion, we identify factors in each context that explain the variance in the extent to which customer knowledge development is practiced

Antecedents of Customer Knowledge Development

Each of the three defining characteristics of the customer knowledge development process described previously creates requirements that need to be fulfilled for the process to unfold effectively across the prelaunch stages of new product development We turn now to an examination of these requirements

Organizations allocate resources among activities by assigning budgets to them However, the accuracy of the budget depends on knowledge of the scope and extent of the activity (Eisenhardt 1988, 1989, Jaworski 1988, Merchant 1985) Given the ongoing nature of customer knowledge development activities both across stages and within each stage of new product development, it is difficult to develop precise estimates of the scope and extent of such activities (Cooper 1998, Damanpour 1991) Accordingly, access to resources other than original budget allocations is the first requirement to be fulfilled for customer knowledge development to be effective (i e , to result in new products that accurately reflect customer preferences)

Customer knowledge development is described as an emergent process because novelty emerges in each stage of new product development on the basis of responsiveness to customer feedback (Huber 1991, Lynn, Morone, and Paulson 1996) Thus, rather than being predetermined, novelty is generated organically in the customer knowledge development process However, for this organic growth to occur, it is essential that the customer knowledge development process learns from and is responsive to customer feedback Therefore, development of the requisite "strategic flexibility" (Eisenhardt and Tabrizi 1995, Grewal and Tansuhaj 2001, Johnson et al 2003) in the customer knowledge development process is the second requirement to be fulfilled for customer knowledge development to be effective

As a process that evolves through trial and error, customer knowledge development entails many failed experiments in the form of ideas, concepts, and prototypes that do not accurately reflect customer preferences Failure in a course of action reduces the motivation to persist with that particular course of action (Leonard 1998, Sitkin 1992) For the people who are directly involved in and responsible for new product development activities, repeated failures in developing ideas, concepts, and prototypes that meet customer preferences can reduce their motivation to persist in the pursuit of successful outcomes Accordingly, the final requirement to be fulfilled for customer knowledge development to be effective pertains to the management of employee motivation to persist with customer knowledge development activities despite repeated failures

We draw on prior research to identify specific actions that organizations can undertake to fulfill each of these requirements for customer knowledge development to occur The provision of resource slack, the creation of cross-functional new product development teams, and the championing of the organizational goal of product leadership are the antecedent constructs in our model that refer to organizational actions that enable the customer knowledge development process to meet the resource, strategic flexibility, and motivation requirements, respectively.

Each of these organizational actions creates the necessary conditions for customer knowledge development to occur. However, we argue that not all organizations that undertake such actions are equally successful at fostering customer knowledge development in their new product development projects. The effectiveness of these organizational actions depends on project characteristics that can moderate the impact of these actions on customer knowledge development. In our conceptual framework, we identify an intelligent-failure reward system, the integration model of conflict resolution, and project members' goal of product leadership as project characteristics that respectively moderate the organizational actions that we listed previously.

Hypotheses

Organizational action: provision of resource slack. Resource slack refers to a situation in which resources in addition to the original budgeted allocation are made available to support the activity (Nohria and Gulati 1996; Sharma 2000). Because the customer knowledge development process is ongoing, it is difficult to forecast resource requirements accurately for the requisite activities in the process. Consequently, a resource cushion is required for the customer knowledge development process to unfold effectively in each stage and across stages. Therefore, the organizational decision to provide resource slack for customer knowledge development activities enables the customer knowledge development process to unfold effectively.

Consistent with this reasoning, prior empirical research has shown that resource availability enhances organizations' customer-related learning in their new product development activities (Dougherty and Hardy 1996; see also the meta-analysis by Henard and Szymanski 2001). On the basis of the preceding theoretical rationale and empirical evidence, we hypothesize the following:

> H_1: The provision of resource slack is positively related to customer knowledge development.

Project characteristic: intelligent-failure reward system. The conventional practice in new product development projects is to provide rewards to employees whose activities yield successful outcomes and to punish directly or indirectly employees whose activities result in failure (Dougherty and Hardy 1996; Leonard 1998). In contrast to this practice, an intelligent-failure system rewards employees who are engaged in new product development projects on the basis of the extent to which they undertake creative and learning-oriented activities, without regard to the immediate success or failure of the activities (Kanter 1988; Sarin and Mahajan 2001; Sitkin 1992).

Resource slack provides the customer knowledge development process with access to additional resources, thereby enabling it to be ongoing. However, the underlying assumption in this argument is that the slack is used in service of customer knowledge development activities. Given the propensity for failure in customer knowledge development activities, employees' willingness to use these resources to further such activities is likely to be directly affected by the presence of disincentives against failure in the new product development project. By removing the disincentives and by actually providing incentives for engaging in learning-oriented activities, an intelligent-failure reward system can enhance employees' willingness to use resources in support of customer knowledge development activities.

Consequently, when such an incentive system exists in the new product development project, we expect that the use of slack resources toward customer knowledge development activities is high; conversely, when such an incentive system does not exist, we expect that resource use in support of customer knowledge development activities is low. Accordingly, we expect the following:

> H_2: The greater the development of an intelligent-failure reward system, the stronger is the positive relationship between provision of resource slack and customer knowledge development.

Organizational action: creation of cross-functional new product development teams. A cross-functional team exists when responsibility for a specific business activity (e.g., new product development) is assigned to a formalized team of personnel from multiple functional areas (Sethi 2000a, b; Sethi, Smith, and Park 2001). For novelty to emerge in the customer knowledge development process, it is necessary for the process to be responsive to customer feedback. Such responsiveness or "strategic flexibility" requires both the rapid dissemination of customer feedback information to the different functional units in the organization and a synergistic coordinated response by the units to this information (Brown and Eisenhardt 1995, 1997; Sheremata 2000). By bringing together people from different functional areas and assigning them responsibility for new product development, cross-functional teams foster both information flow and synergistic coordination, thereby enhancing strategic flexibility in the customer knowledge development process (Nonaka and Takeuchi 1995). Thus, we argue that by creating cross-functional new product development teams, organizations foster the strategic flexibility that is necessary for the effective unfolding of the customer knowledge development process.

Consistent with this argument, field studies (Clark and Fujimoto 1991; Clark and Wheelwright 1992; Griffin 1997) show that adoption of a cross-functional team structure enhanced the pace of learning in new product development projects. Accordingly, we propose the following:

> H_3: The creation of cross-functional new product development teams is positively related to customer knowledge development.

Project characteristic: integration mode of conflict resolution. The integration mode of conflict resolution involves the creation of novel solutions that satisfy the underlying needs of the conflicting parties (Follett 1982). Consider a frequent conflict between the marketing function, which prefers to offer customers customized solutions (thereby enhancing customer satisfaction), and the operations function, which prefers to create standardized products (thereby lowering manufacturing costs). Integration involves the creation of a new solution (e g , mass customization through form postponement, Pine, Victor, and Boynton 1993) that satisfies the underlying needs of both parties

Cross-functional new product development teams create the strategic flexibility that is necessary to enable customer knowledge development to be an emergent process However, the underlying assumption in this argument is that such teams actually generate novelty Although cross-functional teams create appropriate conditions for the emergence of novelty, they are also breeding grounds for conflict given the diverse "thought worlds" (Dougherty 1992, p 182) and interests that exist within them (Dyer and Song 1997, Pinto, Pinto, and Prescott 1993, Song, Xie, and Dyer 2000) If improperly managed, conflict can easily undermine the production of novelty Thus, to harness the potential of cross-functional teams to generate novelty, it is necessary to ensure that team conflicts are managed productively (Lovelace, Shapiro, and Weingart 2001)

The integration mode of conflict resolution fosters the development of creative solutions to conflicts, thereby generating novelty in the customer knowledge development process Consequently, we expect that when new product development projects are characterized by the integration mode of conflict resolution, the novelty-generating potential of cross-functional teams is harnessed and the destructive potential of conflicts is contained Therefore, we hypothesize the following

> H_4 The greater the development of the integration mode of conflict resolution, the stronger is the positive relationship between the creation of cross-functional new product development teams and customer knowledge development

Organizational action championing the organizational goal of product leadership A firm with a "prospector" type of strategic orientation (Lukas 1999, Matsuno and Mentzer 2000, McKee, Varadarajan, and Pride 1989, Miles and Snow 1978)—that is, a firm that wants to create "leading-edge products and services that consistently enhance the customer's use or application of the product, thereby making rivals' goods obsolete" (Treacy and Wiersema 1993, p 84)—manifests the organizational goal of product leadership

As a trial-and-error process, customer knowledge development generates several failed experiments For new product development project members who are involved in the experiments, repeated failures are likely to reduce their motivation to engage in continued experimentation (Sitkin 1992), thereby curtailing the customer knowledge development process

Employees can be motivated to engage in particular activities either because of the outcomes they derive from the activities or because they regard the activities as intrinsically significant (Schein 1992) We argue that by championing product leadership as the organizational goal, the organization infuses the activity of experimentation with "meaning" or intrinsic significance (Bartlett and Ghoshal 1993, Ghoshal and Bartlett 1994) Consequently, we expect that by enhancing employee motivation to persist with experimentation, this organizational action facilitates the effective unfolding of the customer knowledge development process Accordingly, we hypothesize the following

> H_5 The championing of the organizational goal of product leadership is positively related to customer knowledge development

Project characteristic project members' goal of product leadership The organization's goal for itself can be distinguished from the organizational goal of employees (i e , project members) Project members' goal of product leadership refers to the extent to which project members regard product leadership as a desirable organizational goal

The championing of the organizational goal of product leadership infuses customer knowledge development activities with meaning, thereby enhancing project members' motivation to engage in these activities The underlying assumption in this argument is that project members accept this organizational message However, message acceptance by project members depends on their prior beliefs (Areni 2002, Slocum, Cron, and Brown 2002) Specifically, we argue that project members who view product leadership as a desirable organizational goal are more receptive to the organization's message about the importance of product leadership than are project members who do not view product leadership as a desirable organizational goal Consequently, we expect that the motivation to persist with customer knowledge development activities is higher among the former than the latter

Accordingly, we expect that when project members' goal of product leadership is high, the positive effect of championing the organizational goal of product leadership on customer knowledge development is enhanced Consistent with this argument, prior research has shown that congruence between employee and organizational values reduces role conflict and role ambiguity, thereby enhancing employees' motivation to perform (Flaherty, Dahlstrom, and Skinner 1999, Siguaw, Brown, and Widing 1994) On the basis of the preceding theoretical rationale and empirical evidence, we hypothesize the following

> H_6 The greater the project members' goal of product leadership, the stronger is the positive effect of championing the organizational goal of product leadership on customer knowledge development

Consequences of Customer Knowledge Development

Profitability, market share, and market growth rate are commonly used metrics for measuring performance (Deshpandé, Farley, and Webster 1993, Li and Calantone 1998, Matsuno, Mentzer, and Ozsomer 2002, Moorman 1995, Sethi 2000b) As we previously noted, a common reason for new product failure is that the products do not accurately reflect customer preferences There are two reasons customer preference knowledge accuracy can be undermined (1) because the knowledge has been insufficiently verified and (2) because customer preferences have evolved

As an ongoing activity across the stages of new product development, customer knowledge development creates many opportunities for verification of customer knowledge, and it keeps pace with evolving customer preferences to ensure that the new products reflect customer preferences as they exist at the time of product launch Accordingly, by enhancing customer preference knowledge accuracy, we expect that customer knowledge development enhances new product performance Thus, we hypothesize the following

H_7 Customer knowledge development is positively related to new product performance

Controls

In addition to organizational factors, firms may be motivated to engage in customer knowledge development as a strategic response to environmental turbulence Prior research has identified three sources of environmental turbulence (1) competitive intensity, which refers to the extent of competitive activity in the industry, (2) customer dynamism, which refers to the rate of change of customer preferences, and (3) technological turbulence, which describes an environment characterized by continually evolving technological standards (Jaworski and Kohli 1993) We control for the effects of each source on customer knowledge development Furthermore, given that customer knowledge development creates emergent new product designs, it may be the preferred choice in projects for which the intent is to create new-to-the-world innovations (Heany 1983) Accordingly, we control for the extent of innovation that is achieved in the specific new product development project

Method

Sampling Frame and Sample

The sampling frame in this study included marketing managers of divisions (strategic business units) of the top 1000 manufacturing firms (in terms of sales revenue) in Canada The Dun & Bradstreet database contained the name, mailing address, and telephone numbers of people in the sampling frame To enhance the response rate, we telephoned each person in the sampling frame to inform them of our research objectives and to solicit their participation Our survey required respondents to serve as key informants on a recent new product development project in which they were active participants and that was typical of the new product development projects that exist in their firms Thus, an additional objective of the telephone call was to ensure that the respondent had the necessary experience to qualify as a key informant Of the 1000 people in the database, we made contact with 831[1] Of these, 717 expressed an interest in the study and agreed to participate In the following week, we mailed 717 copies of the questionnaire along with a cover letter and a postage-paid return envelope Two weeks later, we sent out reminder and thank-you postcards Over the subsequent week, we received 16 requests for fresh copies of the questionnaire, which we promptly dispatched We closed the survey five weeks after the telephone contact week, having received 169 completed responses from 831 potential respondents (response rate = 20 3%)

Data Characteristics and Evaluation

Prior research (Cooper 1998, Sethi, Smith, and Park 2001) has shown that marketing managers play a critical role in new product development projects Accordingly, we identified marketing managers as key informants on new product development projects Manufacturing firms in high-technology (24%), transportation equipment (33%), and food processing (18%) industries constituted more than 70% of our sample The average sales revenue in the sample was $138 million, ranging from $24 3 million to $1 5 billion

To test for nonresponse bias, we compared the early respondents (the first one-third of respondents) with late respondents (the last one-third of respondents) on firm characteristics such as sales revenue, number of employees, and sector (i e , manufacturing or service), as well as on the model constructs We found no statistically significant differences In other words, we did not discern a threat of nonresponse bias in the data To ensure data quality, we established checks on respondent knowledge of survey issues In addition to the initial check in the telephone interview, the survey included an item that asked respondents to provide a self-report of their level of knowledge of survey issues The mean score on this item was 4 6 on a five-point scale (where 1 = "not at all knowledgeable," and 5 = "highly knowledgeable") Furthermore, the mean number of years of work experience in the division was 12 7 years, and on average the respondents had worked on seven new product development projects in this period Four respondents had worked in the division for less than two years We deleted these respondents from our sample, which brought our effective sample size to 165

Validation of Respondent Data

We requested that study respondents provide the name of one nonmarketing manager who participated in the new product development project, 96 respondents complied with our request We sent copies of the questionnaire to these 96 people and received responses from 25 nonmarketing managers Correlations between the marketing and nonmarketing respondents on the model constructs were statistically significant in all cases, ranging from r = 41 ($p <$ 05) to r = 88 ($p <$ 01), with an average correlation across constructs of r = 73 The results provide additional evidence of the validity of the data that we obtained from our respondents

Measures

Scale development involved mapping out the domain of each construct and establishing scale items to represent the domain Both activities were predicated on our analysis of prior literature and field interviews (Churchill 1979)[2] Following this, we submitted the preliminary scales to qualitative pretesting in interviews with four marketing executives, who proposed several refinements, modifications, and new items We then pretested the scales through a small sample survey (n = 41) of marketing executives Having modified two items on the basis of the survey results, we believed that the questionnaire was ready for large-scale administration We discuss the measures subsequently Note that the scale items are listed in full in the Appendix and that the descriptive statistics of the individual scales are contained in Table 1

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[1] We made three attempts in one week to contact each person

[2] We interviewed 15 people who were not part of the sampling frame In these interviews, we "talked through" our conceptual model with them and used their comments to refine our study constructs and to build measures

Customer knowledge development Drawing on prior conceptual accounts (Hamel and Prahalad 1994, Sitkin 1992) and case studies, we developed a five-item scale to measure the three defining characteristics of this construct, namely, that it is an ongoing, emergent, and trial-and-error process

Provision of resource slack This scale measures the extent to which additional resources were made available for the new product development project We developed three items to represent the existence of resources in addition to those formally budgeted to support new product development We adapted items from prior research (Sharma 2000) to construct this scale

Intelligent-failure reward system We used the conceptual writings of Sitkin (1992) and Kanter (1988) as the bases for the creation of a three-item scale to measure an incentive system that rewards learning from failures

Creation of cross-functional new product development teams This construct represents the existence of formally sanctioned multifunctional groups that are assigned specific business process responsibilities, such as new product development Drawing on prior research (Menon et al 1999, Sethi, Smith, and Park 2001), we developed a four-item measure of this construct

Integration mode of conflict resolution This mode of conflict resolution focuses on the generation of creative solutions that satisfy the underlying interests of the different parties We drew on the conceptual writings of Follett (1982) and on prior conflict resolution scales (Song, Xie, and Dyer 2000) to construct this three-item scale

Championing the organizational goal of product leadership This construct captures the extent to which the organization promotes the goal of being a product leader in the industry among employees Because senior management typically defines organizational goals, our measure focuses explicitly on its role in championing the organizational goal of product leadership We drew on Treacy and Wiersema's (1995) conceptual discussion and on the scale of the "prospector" strategy type, developed by Matsuno and Mentzer (2000), to create a three-item measure of this construct

Project members' goal of product leadership This construct captures the belief among members of the new product development project that their firm should be regarded as a product innovator in the industry We drew on our field interviews to construct this three-item scale

New product performance Following Matsuno, Mentzer, and Ozsomer's (2002, p 21) recommendation to view performance outcomes in "competitive terms," we used the main competitor's new product performance as a reference point with which to compare the firm's new product performance on profitability, market share, and market growth rate We measured performance by the new product's profitability, market share, and growth compared with that of its main competitor We adopted this scale from prior research (see Deshpandé, Farley, and Webster 1993, p 35)

TABLE 1
Correlations and Descriptive Statistics (N = 165)

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1 Provision of resource slack	1 00											
2 Intelligent-failure reward system	12	1 00										
3 Creation of cross-functional new product development teams	07	03	1 00									
4 Integration mode of conflict	18*	14	21**	1 00								
5 Championing the organizational goal of product leadership	– 05	15	29**	07	1 00							
6 Project members' goal of product leadership	03	12	31**	01	33**	1 00						
7 Customer knowledge development	11	33**	56**	29**	36**	10	1 00					
8 Performance	03	13*	26**	16*	21**	07	31**	1 00				
9 Innovation range	09	11	26**	14*	33**	14	34**	– 04	1 00			
10 Competitive intensity	– 17*	– 03	13*	– 18*	19*	02	18*	18*	12	1 00		
11 Customer dynamism	– 07	– 00	09	– 20**	14*	06	15	34**	09	21**	1 00	
12 Technological turbulence	– 12	– 09	– 01	– 09	– 06	00	– 07	– 17*	– 06	30**	17*	1 00
Mean	2 97	3 12	3 91	3 06	3 82	2 77	2 89	1 94	1 69	3 11	3 73	2 90
Standard deviation	1 10	1 73	68	1 81	1 9	98	1 39	46	1 12	96	1 41	1 53
Number of items	3	3	4	3	3	3	5	3	3	3	3	3
Construct reliability	78	83	86	82	82	90	89	74	77	79	81	76

*$p <$ 05
**$p <$ 01
Notes With the exception of performance (which we measured on a three-point scale), we measured all variables on five-point scales All significance tests are one-tailed

Controls turbulence in the customer, competitor, and technological environment sectors. We adapted items from Jaworski and Kohli (1993) to measure these constructs. The scales capture both the variety (e.g., number of different customer types) and the dynamism (e.g., rate of change in customer preferences) aspects of turbulence.

Control innovation range. We developed a three-item scale to measure the extent to which innovation that was developed by the focal new product development project was revolutionary or new to the world rather than incremental and imitative (or me-too) (Heany 1983).

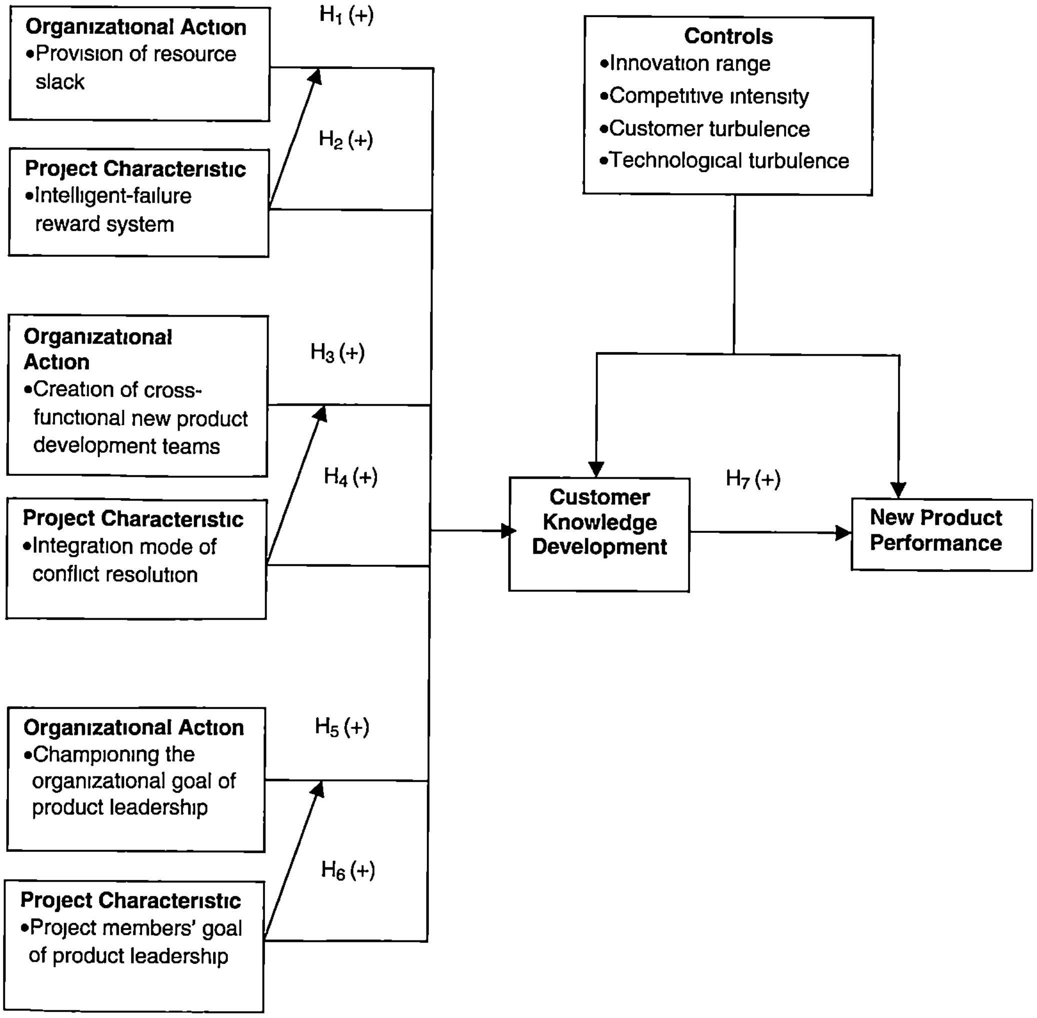
Results

Validation of Measures

We deleted items with low item-to- (scale) total correlations from subsequent analyses, as well as items that exhibited significant cross-loadings and/or did not load significantly on their assigned factor in the exploratory factor analysis. Having performed these preliminary procedures, we then submitted the data to confirmatory factor analysis (CFA).

The first CFA model examined the validity of the antecedent constructs in the research model (i.e., Figure 1). The results show that despite a statistically significant chi-square ($\chi^2 = 212.65$, degrees of freedom [d.f.] = 137, $p < .05$), the other fit indexes (average off-diagonal standardized residual [AOSR] = .04, normed fit index [NFI] = .90, nonnormed fit index [NNFI] = .91, and comparative fit index [CFI] = .93) provide evidence of a good fit of the model to the data, thereby confirming the validity of the measures of the antecedent constructs. The second CFA model examined the validity of the customer knowledge development construct along with the outcome construct (i.e., new product performance) in the research model. The results again show that despite a statistically significant chi-square ($\chi^2 = 29.31$, d.f. = 19, $p < .05$), the other fit indexes (AOSR = .02, NFI = .97, NNFI = .95, CFI = .97) provide evidence of a good fit of the model to the data, thereby confirming the validity of the measures of customer knowledge

FIGURE 1
Factors That Affect Customer Knowledge Development and Its Effect on New Product Performance


Organizational Action
•Provision of resource slack
Project Characteristic
•Intelligent-failure reward system
Organizational Action
•Creation of cross-functional new product development teams
Project Characteristic
•Integration mode of conflict resolution
Organizational Action
•Championing the organizational goal of product leadership
Project Characteristic
•Project members' goal of product leadership
H_1 (+)
H_2 (+)
H_3 (+)
H_4 (+)
H_5 (+)
H_6 (+)
Controls
•Innovation range
•Competitive intensity
•Customer turbulence
•Technological turbulence
Customer Knowledge Development
H_7 (+)
New Product Performance

development and new product performance Furthermore, in both CFA models, the item loadings on their respective constructs were statistically significant (t = 12 11, $p < 01$ was the weakest loading) (Anderson and Gerbing 1988) Note that all factor loadings are shown in the Appendix

The construct reliability of each model construct was greater than 70, which, coupled with the statistically significant item loadings, provides evidence for the convergent validity of the measures To assess discriminant validity of the measures, we sequentially (and independently) constrained all the construct correlations in both CFA models to unity We then compared the chi-square statistic of the constrained model with the chi-square statistic of the free model In each case, the chi-square of the constrained model was greater than that of the free model (difference in $\chi^2 = 35\ 44$, d f = 1, $p < 01$ was the smallest difference), thereby indicating that the free model provides a better representation of the data The results provide evidence for the discriminant validity of the measures (Gerbing and Anderson 1988) In addition, the results from the exploratory factor analysis also provide evidence for the discriminant validity of the measures examined as a whole (i e , all the items being examined simultaneously)

Given that we collected the data on both the independent and the dependent variables from the same respondent with the same questionnaire format, the potential for common methods bias exists To assess the manifestation of this problem, we performed the Harman's one-factor test on the items (Podsakoff and Organ 1986) The results of a principal components factor analysis show ten factors with an eigenvalue greater than 1 These factors account for 78% of the total variance Because many factors emerged from the factor analysis and because the first factor accounted for only 23% of the total variance, common methods bias does not appear to exist in the data (Menon et al 1999, p 31) The correlation matrix and descriptive statistics for the study variables are presented in Table 1

Hypothesis Testing

We used multiple regression analysis to test the effects of the controls, the antecedents, and their interactions on customer knowledge development (see Table 2) Given that we estimated both main and constituent interaction terms in this regression equation, the potential for multicollinearity was high Consequently, we used the mean-centering approach (Aiken and West 1991), which involves using mean-centered values of the independent variables and their interactions Examination of the variance inflation factors for the regression equation showed that the highest variance inflation factor was 2 17, which is well below the cutoff value of 10 that indicates multicollinearity (Neter, Wasserman, and Kutner 1990) We tested the effect of customer knowledge development on new product performance using ordinary least squares regression (see Table 3)

With the exception of the main effect of the provision of resource slack (H_1) and the moderating effect of project members' goal of product leadership (H_6), all the hypotheses were supported by our research results (see Tables 2 and 3)

With respect to the moderating effect of intelligent-failure reward systems on the main effect of the provision of resource slack on customer knowledge development (H_2), we performed a follow-up analysis on the significant interaction effect reported in Table 2 by splitting the moderator variable (i e , intelligent-failure reward system) on its mean and by comparing the effect of the provision of resource slack on customer knowledge development in the two groups (i e , low and high intelligent-failure reward system) Consistent with our expectation, the strength of the positive relationship between provision of resource slack and customer knowledge development was greater in the

TABLE 2
Regression Results of Antecedents of Customer Knowledge Development

Independent Variables	Standardized Coefficients	t-Value	Results
Innovation range	21	(2 11)**	
Customer turbulence	10	(1 38)*	
Competitive turbulence	16	(1 65)**	
Technological turbulence	– 01	(– 21)	
Provision of resource slack	06	(1 11)	H_1 not supported
Intelligent-failure reward system	21	(2 11)**	
Creation of cross-functional new product development teams	27	(3 01)***	H_3 supported
Integration mode of conflict resolution	18	(1 98)**	
Championing the organizational goal of product leadership	20	(2 09)**	H_5 supported
Project members' goal of product leadership	07	(1 29)*	
Resource slack × reward system	19	(2 03)**	H_2 supported
Cross-functional team × integration mode of conflict resolution	46	(5 92)***	H_4 supported
Organizational goal × project members' goal	11	(1 48)*	H_6 not supported
Adjusted R^2	47		

*$p < 10$
**$p < 05$
***$p < 01$
Notes All significance tests are one-tailed

TABLE 3
Results of Regressions on New Product Performance

Independent Variables	Standardized Coefficients	t-Value	Results
Innovation range	– 01	(– 11)	
Customer turbulence	12	(1 48)*	
Competitive turbulence	08	(1 18)	
Technological turbulence	– 01	(– 18)	
Customer knowledge development	28	(3 11)**	H_7 supported
Adjusted R^2	20		

*$p < 10$
**$p < 01$

high-mean group (b = 43, t = 8 14, $p < 01$) than in the low-mean group (b = 11, t = 1 41, $p < 10$) The results provide further support for H_2 A similar follow-up analysis on the moderating effect of integration mode of conflict resolution on the relationship between the creation of cross-functional new product development teams and customer knowledge development (H_4) showed that the main effect of this independent variable on customer knowledge development was stronger in the high-mean group (b = 67, t = 9 90, $p < 01$) than in the low-mean group (b = 18, t = 1 70, $p < 10$), thereby providing additional evidence in support of H_4

Evaluating the Direct Effects of the Antecedents on New Product Performance

Our model (see Figure 1) posits that customer knowledge development is a perfect mediator between the antecedents and outcomes To validate this claim, we used Baron and Kenny's (1986, p 1177) tests of mediation Of the independent variables that had a significant effect on customer knowledge development (see Table 2), only the creation of cross-functional new product development teams (b = 23, t = 2 41, $p < 01$), the integration mode of conflict resolution (b = 16, t = 1 67, $p < 05$), and the championing of the organizational goal of product leadership (b = 18, t = 1 97, $p < 05$) had statistically significant, direct effects on new product performance Having controlled for the effect of customer knowledge development on new product performance, we found that only the creation of cross-functional new product development teams had a statistically significant effect (b = 16, t = 1 67, $p < 05$) on new product performance, though the effect was weaker than it was when we did not include customer knowledge development as a predictor Thus, the results from the tests for mediation show that customer knowledge development completely mediates the effects of the integration mode of conflict resolution and the championing of the organizational goal of product leadership, and it partially mediates the effect of creation of cross-functional new product development teams Accordingly, we conclude that the contention that customer knowledge development is a mediator is supported by our results to a limited extent

Discussion

Our research contributes to the literature on customer knowledge development in new product development projects in three ways (1) by developing a formal construct that captures the defining characteristics of the customer knowledge development process, (2) by identifying the antecedents, moderators, and outcomes of this process, and (3) by providing a large-scale empirical test of our proposed nomological network

Our finding that customer knowledge development enhances new product performance emphasizes the strategic significance of the customer knowledge development process in new product development projects We identified three requirements that must be fulfilled for the customer knowledge development process to unfold effectively The process requires (1) access to resources, (2) strategic flexibility, and (3) management of project members' motivation On the basis of these requirements, we identified the provision of resource slack, the creation of cross-functional new product development teams, and the championing of the organizational goal of product leadership as antecedents of customer knowledge development The results show that both the creation of cross-functional new product development teams and the championing of the organizational goal of product leadership foster customer knowledge development, with the effect being that the provision of resource slack is not significant

In addition to the main effects of organizational actions, we identified project characteristics as moderators of the main effects The results show that intelligent-failure reward systems enhance the positive effect of the provision of resource slack on customer knowledge development and that the constructive conflict mode of conflict resolution enhances the positive effect of cross-functional new product development teams on customer knowledge development The moderating effect of project members' goal of product leadership on the relationship between championing the organizational goal of product leadership and customer knowledge development is not significant

Because we previously discussed the rationale for the hypotheses that were supported, we focus our attention here on the hypotheses that were not supported, namely, the main effect of provision of resource slack (H_1) and the moderating effect of project members' goal of product leadership (H_6)

The nonsignificant main effect of the provision of resource slack on customer knowledge development, coupled with the significant moderating effect of an intelligent-failure reward system on the relationship, suggests that it is not the existence of slack per se, but the extent to which project members receive incentives for using slack in service of customer knowledge development activities that determines the extent to which customer knowledge development occurs Prior literature on the relationship between organizational slack and innovation-related activities has identified two conditions—namely, the nature of slack (i e , the extent to which it is dedicated to innovation-related activities) (Singh 1986) and the level of slack (i e , a moderate level as opposed to the extremes) (Nohria and Gulati 1996)—under which organizational slack is positively related to innovation The results from our research imply a third condition under which organizational slack is positively related to innovation, namely, the extent to which incentives are provided to use the slack

Given the lack of support for the moderating effect of project members' goal of product leadership, we speculate that rather than being a moderator, this construct may mediate the effect of championing the organizational goal of product leadership on customer knowledge development Thus, rather than being a preexisting belief, project members' goal of product leadership may be fostered by championing the organizational goal, with project members' goal of product leadership in turn motivating project members' engagement in goal-fulfilling behavior (Hartline, Maxham, and McKee 2000, Slocum, Cron, and Brown 2002) We tested this argument following Baron and Kenny's (1986) procedures and found that championing the organizational goal of product leadership has a statistically significant effect on customer knowledge development (b = 20, t = 2 09, $p <$ 05) and project members' goals of product leadership (b = 35, t = 5 89, $p <$ 01) and that its effect on customer knowledge development is not significant when the effect of project members' goal of product leadership is estimated (b = 07, t = 1 14, p = not significant) This pattern of results provides empirical support for our *post hoc* argument that project members' goal of product leadership mediates the relationship between championing the organizational goal of product leadership and customer knowledge development

Managerial Implications

On the basis of our research results, we identify specific actions that both senior management and managers of new product development projects must implement for customer knowledge development to occur For senior management, our results underscore the importance of creating and assigning the responsibility of new product development to cross-functional teams In addition, our results point to the importance of senior management championing the organizational goal of product leadership, because this has the effect of infusing customer knowledge development activities with meaning and significance, thereby enhancing the motivation of project members to engage in such activities

For new product development project managers, our results emphasize the importance of designing incentive systems that reward innovation-related activities instead of outcomes Furthermore, our results point to the importance of cultivating a culture of constructive conflict resolution in cross-functional new product development teams

Limitation and Future Research Directions

The cross-sectional nature of our data does not facilitate testing of the causal sequence that is implied in Figure 1 A longitudinal research design is necessary to validate these claims of causality Furthermore, because respondents provided data on both the independent and the dependent variables, there is the possibility that the correlations are inflated as a result of single-source bias The results of Harman's one-factor test (Podsakoff and Organ 1986) enabled us to rule out single-source bias However, the fact remains that data collected from multiple sources (e g , senior management, organizational employees) would have provided a stronger test of the model

Our model of customer knowledge development focuses on intrafirm characteristics that enhance this process However, because customer knowledge development occurs at the firm–customer interface, it is also necessary to examine the role of customer-related factors in fostering this process Further research should (1) identify the factors that foster customers' effective participation in the process of customer knowledge development and (2) study how customer-related factors moderate the main effects of organizational actions on customer knowledge development

Appendix
Study Measures

Independent Variables (CFA Model 1 χ^2 = 212 65, d f = 137, $p <$ 05, AOSR = 04, NFI = 90, NNFI = 91, CFI = 93)

Provision of resource slack (construct reliability = 78) In this project, additional resources were made available when

1 The cost of new product development exceeded original estimates (88, t = 14 88)
2 The cost of developing new product ideas exceeded original estimates (74, t = 13 49)
3 The cost of testing new product ideas exceeded original estimates (72, t = 13 12)

Intelligent-failure reward systems (construct reliability = 83)

1 In this project, individuals were rewarded for developing new ideas, regardless of the eventual success/failure of these ideas (81, t = 14 09)
2 In this project, individuals were rewarded for testing new ideas, regardless of the eventual success/failure of these tests (88, t = 14 89)
3 In this project, individuals were rewarded for codifying the knowledge that was created from idea development and testing, regardless of the success or failure of these ideas (80, t = 13 99)

Creation of cross-functional new product development teams (construct reliability = 86)

1 This project comprised individuals drawn from a number of different functional areas (87, t = 14 83)
2 In our organization, functional areas are viewed as resource pools from which to draw personnel for cross-functional teams (83, t = 14 31)

3 This project team was given a budget and had specific responsibilities in terms of new product development (85, t = 14 59)
4 In our organization, budgets and responsibilities are allocated only to functional areas (86, t = 14 67) (reverse coded)

Integration mode of conflict resolution (construct reliability = 71)

1 In this project, conflicts were resolved by developing creative solutions that meet the underlying needs of the parties (78, t = 13 90)
2 In this project, conflicts were resolved by addressing their root causes (68, t = 12 86)
3 In this project, the resolution of conflicts left both parties with increased knowledge and understanding of the total system and of their role in this system (61, t = 12 11)

Championing the organizational goal of product leadership (construct reliability = 82)

1 Senior management has repeatedly stated that innovations in product and strategy are key to the firm's success (66, t = 12 70)
2 Senior management has made it clear that the firm differentiates itself from competitors in the industry by being a superior innovator (87, t = 14 74)
3 Senior management believes that innovation is what this company is fundamentally about (81, t = 14 08)

Project members' goal of product leadership (construct reliability = 90)

1 The members of this project team understood that innovations in product and strategy are key to the firm's success (83, t = 14 37)
2 The members of this project team believed that firm differentiates itself from competitors in the industry by being a superior innovator (94, t = 15 49)
3 The members of this project team were convinced that innovation is what this company is fundamentally about (85, t = 14 49)

Focal and Outcome Constructs (CFA Model 2 χ^2 = 29 31, d f = 19, $p <$ 05, AOSR = 02, NFI = 97, NNFI = 95, CFI = 97)

Customer knowledge development (construct reliability = 89) Please rate these to the extent that they characterize the new product development (NPD) process in this project

1 We went through lots of iterations based on customer feedback prior to launching the product in the market (92, t = 15 14)
2 We developed and tested lots of new ideas over the course of this NPD process (90, t = 14 97)
3 The NPD process in this project involved numerous failed experiments (91, t = 15 05)
4 We learned about customer preferences as we worked with them through the new product iterations (79, t = 13 84)
5 The actual new product that we took to market was very different from our initial expectation (78, t = 13 90)

New product performance (construct reliability = 74) Relative to our main competitor's new product, the performance of the new product developed by this project is

1 (a) Less profitable, (b) about equally profitable, (c) more profitable (82, t = 14 29)
2 (a) Has a lower market share, (b) has about the same market share, (c) has a greater market share (69, t = 12 90)
3 (a) Has a slower growth rate, (b) has about the same growth rate, (c) has a faster growth rate (73, t = 13 36)

Control Variables

Innovation range (construct reliability = 78)

1 Please evaluate the "newness" of the product on the following scale (69, t = 12 94) a = "line extension," b = "new to the company," and c = "new to the industry"
2 Please evaluate the "distinctiveness" of the value proposition on the following scale (81, t = 14 15) a = "me-too value proposition," b = "somewhat distinct from the competition," and c = "significantly different from the main competitor"
3 Please evaluate the "newness" of product features on the following scale (77, t = 13 73) a = "minor modifications to existing features," b = "new features to this company," and c = "new features to this industry"

Customer turbulence (construct reliability = 79)

1 Customers' preferences for product features have changed quite a bit over time
2 We are witnessing demand for our products from customers who never bought them before
3 New customers tend to have product-related needs that are different from those of our existing customers

Competitor turbulence (construct reliability = 81)

1 Our competitors are constantly changing their product features
2 Our competitors are constantly changing their sales strategies
3 New competitors are entering our industry (new item)

Technological turbulence (construct reliability = 76)

1 The technology in our industry is changing rapidly
2 It is unlikely that today's technological standard will still be dominant five years from now
3 Technological breakthroughs contribute to the development of new product ideas in our industry

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Pamela W. Henderson, Joan L. Giese, & Joseph A. Cote

Impression Management Using Typeface Design

This article develops empirically based guidelines to help managers select typefaces that affect strategically valued impressions The authors discuss the potential trade-offs among the impressions created by typeface (e g , pleasing, engaging, reassuring, prominent) The selection of typeface can be simplified with the use of six underlying design dimensions elaborate, harmony, natural, flourish, weight, and compressed

The visual aspects of a corporation's marketing materials are receiving increasing attention in marketing research (Childers and Jass 2002, Henderson and Cote 1998, Shapiro 1999, Tavassoli 2001, 2002, Tavassoli and Han 2001, 2002, Veryzer and Hutchinson 1998) By far, the most pervasive design element in marketing materials is typeface Both academicians and practitioners recognize that typeface design is an important visual tool for accomplishing corporate communication objectives (Childers and Jass 2002, Hutton 1987, McCarthy and Mothersbaugh 2002, Pan and Schmitt 1996, Tantillo, DiLorenzo-Aiss, and Mathisen 1995) Initial research indicates that typeface design affects perceptions of advertised brands, influences the readability and memorability of advertisements (Childers and Jass 2002, McCarthy and Mothersbaugh 2002), creates strategically important impressions (e g , general positive image to more specific impressions of innovativeness, change, power, or warmth, see Craig 1980, Dolen 1984, Hinrichs and Hirasuna 1990, Hutton 1987, 1997, O'Leary 1987, Solomon 1991, Somerick 2000, Spaeth 1995, Tantillo, DiLorenzo-Aiss, and Mathisen 1995), affects the appropriateness of a typeface for different products (Pan and Schmitt 1996, Walker, Smith, and Livingston 1986), and may affect a company's financial performance (Bloch 1995, Hertenstein and Platt 2001, Hutton 1997, Wallace 2001)

Despite increasing research on the subject, little guidance is available to assist corporations in selecting typeface to create strategically important impressions Research on the impressions created by typeface has assessed only a few of the many characteristics that differentiate typeface design Characteristics studied include serif and sans serif (Tannenbaum, Jacobson, and Norris 1964, Tantillo, DiLorenzo-Aiss, and Mathisen 1995), general use and novel display, weight (Rowe 1982), and italics (Tannenbaum, Jacobson, and Norris 1964) In addition, most studies have examined only a small set of typefaces (i e , ten or fewer), thus limiting the variance that participants see from the extensive pool of fonts from which corporations make their selections Furthermore, conflicting results continue to surface (e g , Rowe 1982, Tantillo, DiLorenzo-Aiss, and Mathisen 1995) In general, the only conclusion that researchers agree on is that typeface design affects responses, yet the nature of its effects is not well known This lack of guidelines led McCarthy and Mothersbaugh (2002) to call for research to create a set of principles that link the features of type with the impressions they create

In this article, we develop a set of empirically based guidelines to improve managers' ability to choose typefaces that affect strategically valued impressions In particular, we address four questions

1 What are the strategically relevant impressions created by typeface design?
2 What characteristics are most useful for describing typeface design?
3 What is the impact of design on each kind of impression?
4 What guidelines should corporations follow to achieve their communication goals through the use of typeface design?

We conducted an exploratory study of current typeface designs and the impressions they create Because our study is exploratory in nature, it is not based on a specific theoretical perspective However, there are a few theories related to the possible dimensions of impressions and design characteristics that help direct the analysis Thus, we briefly review theories and empirical research related to the dimensionality of design and the impressions they create for other stimuli

Review of Typeface Design Effects

There are two classes of studies that enable us to anticipate the influence of typeface design characteristics on consumer responses First, several empirical studies have directly explored the relationship between a typeface's

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characteristics (e g , serifs) and a response (e g , innovativeness) For example, Tantillo, DiLorenzo-Aiss, and Mathisen (1995) investigate the influence of typeface on selected affective responses (e g , happy/sad, young/old) and find many response differences between the sans-serif and serif typefaces, whereas in a similar study, Rowe (1982) finds few differences Although both studies are worthy initial efforts, they fail to investigate samples of fonts that have a representative range of design characteristics The studies also fail to consider the full array of responses to fonts

A second class of studies that offers insight into the influence of typeface design characteristics on consumer responses is research on aesthetics Perception-based theories (e g , Gestalt psychology) suggest that simple and harmonious designs are liked more than complex and disharmonious designs (Bornstein and D'Agostino 1992, Klinger and Greenwald 1994, Van den Bergh and Vrana 1998, Veryzer and Hutchinson 1998, Whitfield and Slater 1979, Whittlesea 1993) Motivation-based theories suggest that more elaborate designs increase arousal and are liked more (i e , this takes the form of a ∩-shaped relationship, see Berlyne 1971, Hirschman 1980) Other theories, such as prototypicality and conditioning, attempt to explain why some stimuli are more pleasing than others, but they develop no clear link between design characteristics and responses (Martindale 1988, Martindale and Moore 1988, Veryzer 1999, Veryzer and Hutchinson 1998, Whitfield 1983, Whitfield and Slater 1979) Purely empirical work on logo design indicates that there is a linear, positive relationship between a harmonious design and a pleasingness response and a ∩-shaped relationship between an elaborate design and a pleasingness response (Henderson and Cote 1998) Henderson and Cote (1998) also find a positive relationship between natural designs and liking, but they present no theory to explain this link, nor do they address dimensions of response other than pleasingness and liking In summary, theory and prior research provide insufficient guidance for managing the range of impressions influenced by typeface design

Responses to Typeface Characteristics

In determining impressions created by typeface design, we first consider what constitutes a response From a purely empirical standpoint, the design literature has documented various responses to art and design (e g , honest, distinctive, happy, warm, graceful, beautiful, masculine, powerful, interesting, intense, emotional, see Craig 1980, Ernst 1977, Rowe 1982, Solomon 1991, Tantillo, DiLorenzo-Aiss, and Mathisen 1995) More broadly, we consider what might drive response First, design adds meaning to the stimulus (beyond the simple depiction of letters) In their seminal research on rating the meaning of concepts, Osgood, Suci, and Tannenbaum (1957) conclude that responses can be accounted for by three underlying dimensions evaluation (e g , good, pleasant, beautiful), activation (e g , hot, active, fast), and potency (e g , strong, brave, rugged) Second, design also conveys emotion Mehrabian and Russell (1974) have shown that basic emotions or affective responses are captured by three dimensions pleasingness (e g , pleased, contented, relaxed), arousal (e g , excited, aroused, jittery), and dominance (e g , important, influential, controlling) Finally, in the context of a corporation, design communicates something about the company As such, we turn to the spokesperson literature Much as a spokesperson "dresses up" the advertiser's spoken words, so does typeface design dress up the written word Spokesperson research involves the conceptualization and measurement of responses to celebrity endorsers as three underlying dimensions attractiveness (e g , elegant, beautiful, attractive), trustworthiness (e g , honest, sincere, dependable), and expertise (e g , skilled, qualified, experienced, see Ohanian 1990)

There are noticeable similarities to the responses that Osgood, Suci, and Tannenbaum (1957), Mehrabian and Russell (1974), and Ohanian (1990) study Similarities are evident in the evaluation, pleasingness, and attractiveness dimensions, the activation and arousal dimensions, and the potency and dominance dimensions In addition, the trustworthiness dimension is discussed in the typology literature and is critical to spokesperson response and to businesses in general However, expertise seems to be irrelevant to typeface design

Design Characteristics of Typeface

Typeface design can be distinguished by universal and typeface-specific characteristics Universal design characteristics are subjective descriptions of the typeface, including characteristics such as symmetry, activity, and complexity As such, universal design characteristics are holistic descriptions that rely on perception and can be used to describe various stimuli (e g , symbols, objects, pictures) beyond just type Typeface-specific design characteristics are graphic descriptions of the fonts, including characteristics such as short/tall, serif/sans serif, and condensed/extended Typeface-specific characteristics are not as subjective and provide an opportunity to explain additional variance in responses specific to typeface design In effect, the examination of universal characteristics allows for greater generalizability of findings, whereas the examination of typeface-specific characteristics provides an opportunity to hypothesize about additional design factors and/or to engineer a typeface to meet specific goals

Although there is no direct research on the universal characteristics of typeface design, research on logo design has proposed three universal dimensions elaborateness (complex, active, and depth), naturalness (representative and organic), and harmony (balance and symmetry, see Henderson and Cote 1998, Henderson et al 2003) These dimensions may or may not hold for typeface There is no research that indicates the dimensionality of typeface-specific characteristics It is also difficult to anticipate whether typeface-specific dimensions are independent of universal design dimensions On the one hand, typeface-specific characteristics, such as serifs and ascenders, appear to be specific to type because they do not clearly relate to a universal dimension On the other hand, some typeface-specific characteristics, such as a handwritten or typed appearance, seem to relate to universal dimensions for logos, such as naturalness. Unfortunately, neither empirical nor theoretical information regarding typeface characteristics is sufficient to provide much guidance on dimensionality.

Goal of Research

Our review of the design literature suggests that there are no meaningful guidelines for typeface design. The lack of guidelines may lead to designs that do not achieve corporate objectives. For example, reports on corporations changing their logos (logotypes primarily consisting of a specially designed typeface) typically discuss the image that management hopes to communicate through the new typeface (Spaeth 1994, 1995, 1999). Yet the implicit assumption of a single response to a logo is probably incorrect. It is more likely that there are multiple responses to a logo and that the corporation must consider trade-offs among responses when developing its communication goals. Thus, guidelines are needed to assist corporations in managing the range of impressions created through their choices. To develop meaningful guidelines for typeface selection, we conducted an empirical investigation to determine the design dimensions that best capture differences among typefaces, the response dimensions typefaces generate, and how typeface design dimensions are related to response dimensions. On the basis of the empirical findings, we then provide guidelines for corporations to use when selecting typeface.

Research Method

Data collection required four stages. First, we identified appropriate typeface design characteristics and selected a sample of representative typefaces. Second, professional graphic designers and advertisers rated typefaces on the selected design characteristics. Third, we identified a list of strategically relevant impressions. Fourth, consumers responded to the typefaces on the impression measures.

Phase 1: Selection of Design Characteristics and Typefaces

As we noted previously, universal design dimensions (e.g., natural, harmony, elaborate) should be relevant for all types of stimuli. Universal dimensions can be captured by either universal design variables (e.g., the symmetry variable loads onto the harmony dimension for brand logos) or typeface-specific variables (e.g., handwritten is more organic than machine-made type). In addition, there are also likely to be design dimensions that are unique to the specific stimulus. These typeface-specific dimensions can be captured only by typeface-specific variables.

In Phase 1, we developed a list of universal and typeface-specific design characteristics. We used design characteristics included in publications on typology to construct an initial list. Next, we asked five professional graphic designers from different firms that work with a wide range of corporations to list the primary characteristics that differentiate typeface design. The final list consisted of 16 universal and 8 typeface-specific design characteristics. Table 1 lists the typeface design characteristics and provides illustrative fonts.

The five professional designers each provided an extensive list (40–150) of commercially available typefaces representative of variation on the design characteristics they had identified. To broaden the range of typefaces further, we purchased additional typeface software. On the basis of this input, we selected 210 typefaces that represented the full range for each of the 24 design characteristics (e.g., extremely complex typefaces to extremely simple typefaces) and had both upper and lower case sets (some specialty typefaces only have an upper case).

Phase 2: Ratings of Design Characteristics

Eighty-two professional graphic designers, who worked in agencies and corporations, rated the 210 typefaces on seven-point semantic differential scales for each of the 24 characteristics. To minimize fatigue, each designer rated between 10 and 30 typefaces on 12 of the 24 characteristics. We presented typefaces on white paper in 16-point font size in full alphabetic (uppercase and lowercase) and numeric forms. We used a paper-and-pencil method to ensure that typefaces appeared true to form, because computer and software differences across design agencies pose difficulties in maintaining consistent typeface appearances for research purposes. In all, we obtained 17,683 individual ratings from professional designers.

Phase 3: Selection of Impression Responses

Because our goal is to provide guidance to corporations, we researched impressions that corporations and designers aim to create through typeface. Managerially oriented design literature and input from five professional graphic designers revealed the responses believed to result from typeface design and that are relevant to the general communication goals of corporations. These impressions include innovative, calm, liking, interesting, formal, strong, warm, honest, familiar, emotional, masculine/feminine, and attractive. To confirm the relevance of these impressions, 35 additional professional designers rated their perceived ability to select typefaces that elicited the responses. The results indicate that the designers believed that they could select typefaces to create the impressions and that the impressions were meaningful to them and to their corporate clients.

We purposely did not refer to scales found in the meaning (Osgood, Suci, and Tannenbaum 1957), emotion (Mehrabian and Russell 1974), or spokesperson (Ohanian 1990) literature, because we wanted the results of the study to address specific corporate goals. This approach provides a stronger test of the dimensions of response in the context of type than if we had used scales from these studies. Still, there is enough similarity in the evaluations that meaningful comparisons are possible.

Phase 4: Ratings of Impressions Created by Typefaces

Phase 4 involved obtaining responses to the typefaces. Because of the challenge of gathering a large sample of evaluations of 210 typefaces on each of the 12 response variables, we used a laboratory-based computer task. We visually examined and measured the computer display of each typeface to guarantee that appearance, size, and reso-

TABLE 1
Examples of Design Characteristics

Design Characteristic	High	Low	Characteristics	Design Factor
Ornate/plain	ABCYabcy	ABCYabcy	Universal	Elaborate
Special use/common use	ABCYabcy	ABCYabcy	Specific	Elaborate
Depth/flatness	ABCYabcy	ABCYabcy	Universal	Elaborate
Distinctive/not distinctive	abCYabcY	ABCYabcy	Universal	Elaborate
Conveys meaning/does not convey meaning	ABCYabcy	ABCYabcy	Universal	Elaborate
Readable/not readable	ABCYabcy	ABCYabcy	Specific	Elaborate
Balanced/unbalanced	ABCYabcy	ABCYabcy	Universal	Harmony
Smooth/rough	ABCYabcy	ABCYabcy	Universal	Harmony
Symmetrical/asymmetrical	ABCYabcy	ABCYabcy	Universal	Harmony
Uniform/not uniform	ABCYabcy	ABCYABCY	Universal	Harmony
Organic/geometric[a]	ABCYabcy	ABCYabcy	Universal	Natural
Looks typed/looks handwritten	ABCYabcy	ABCYabcy	Specific	Natural
Active/passive	ABCYabcy	ABCYabcy	Universal	Natural
Slanted/straight	ABCYabcy	ABCYabcy	Universal	Natural
Curved/angular	ABCYabcy	ABCYabcy	Universal	Natural
Heavy/light	ABCYabcy	ABCYabcy	Specific	Weight
Short and fat/tall and thin	ABCYabcy	ABCYabcy	Specific	Weight
Repeated/no repeated elements	ABCYabcy	ABCYabcy	Specific	Weight
Serif/sans serif	ABCYabcy	ABCYabcy	Specific	Flourish
Ascenders are pronounced/not pronounced[b]	ABCYabcy	ABCYabcy	Specific	Flourish
Descenders are pronounced/not pronounced	ABCYabcy	ABCYabcy	Specific	Flourish
Condensed/extended[c]	ABCYabcy	ABCYabcy	Specific	Compressed
x-Height tall/short[d]	ABCYabcyx	ABCYabcyx	Specific	Compressed

[a] Organic fonts are more irregular, unplanned, or natural, whereas geometric fonts resemble objects that are man-made, planned, or measured

[b] Ascenders (descenders) are the parts of the letter that go above (below) the main body, such as the top of a lowercase h (the tail of a lowercase y) Pronounced ascenders (descenders) appear to go significantly above (below) the body of the letter or stand out in their influence on the appearance of the letter

[c] "Condensed" refers to only the width of the letter Condensed letters are narrow, and extended letters have a wider base

[d] "x-Height" refers to the height of the lowercase x in the font Tall letters are letters for which the height of the x almost equals that of the uppercase letter Short x-height occurs when the x is much shorter than the uppercase letter

Notes A more complete set of examples, including examples for the response variables, is available on request

lution were the same on the monitor as on the printed pages to which graphic designers responded We dropped one typeface because its appearance on the computer was slightly different from its appearance in print Software was written to select 20 typefaces randomly to present to the respondents Each typeface was presented individually as a complete alphabet and number set accompanied by 6 of the 12 seven-point semantic differential scales (e g , like/dislike, strong/delicate) The participants controlled the speed of typeface viewing and responding We obtained more than 60,000 response ratings from 336 upper-division students at a large university, with an average of 24 3 responses per typeface The use of students in design research has been justified repeatedly by findings that show a surprising consistency in aesthetic response across age groups (Berlyne 1971, Eysenck 1988)

Analysis and Results

We analyzed the data with the approach used in experimental aesthetics and in research on language processing (e g , Berlyne 1974, Bradshaw 1984) We conducted analyses at the stimulus level rather than the individual level This requires averaging across individual ratings of a stimulus (typeface) on a particular characteristic or impression response to obtain a score for the stimulus on that variable We conducted all remaining analyses using these stimulus scores Thus, the unit of analysis is the typeface, and the sample size for each analysis is the number of typefaces (209) This approach is particularly appropriate for marketing management because it recognizes that stimuli are designed for, managed for, and responded to by groups of people rather than by individuals

The variables we used in the analyses were 23 averaged design characteristics and the 12 averaged responses We dropped 1 of the original 24 design characteristics (frequency of use) because we concluded that it reflected not design, but designers' behavior

What Are the Strategically Relevant Response Dimensions?

Consistent with the work of Henderson and Cote (1998), we started by conducting an exploratory factor analysis (EFA) of the impressions data The analysis produced three factors However, one factor included positive loadings for interesting, emotional, and innovative and negative loadings for calm, formal, honest, and familiar This factor was cumbersome to interpret because it combined the activation and arousal dimension (Mehrabian and Russell 1974, Osgood, Suci, and Tannenbaum 1957) with a variant of the trustworthy response dimension implied in the spokesperson literature An attempt to replicate the EFA results using confirmatory factor analysis (CFA) indicated the problems with the EFA factor structure (comparative fit index [CFI] = 658 and low loadings for emotional and interesting) We respecified the CFA to include four factors, which roughly corresponded to the dimensions of evaluation, pleasingness, and attractiveness, activation and arousal, potency and dominance, and trustworthiness found in previous research on emotions, evaluations of objects, and spokesperson perceptions (see Table 2) The model fit the data reasonably well (CFI = 806), and all the loadings were quite high ($\lambda > 7$, with the exception of strong/delicate) The correlations among the impression factors were modest but significant (see Table 3) In addition, half the correlations were negative, which indicates an implicit trade-off between impression responses

On the basis of these results, we used four dimensions to describe the impression variables Pleasing/displeasing comprised liked, warm, and attractive Engaging/boring comprised interesting and emotional Reassuring/unsettling comprised calm, formal, honest, familiar, and a negative loading for innovative (whose opposite endpoint was mainstream) Finally, prominent/subtle included strong (whose opposite endpoint was delicate) and masculine We used summed scores to capture each dimension

Which Dimensions Best Capture Typeface Design?

As we described previously, the design characteristics consisted of universal and typeface-specific characteristics Universal characteristics included distinctive, ornate, special use, conveys meaning, depth, uniform, balanced, smooth, symmetrical, curved, organic, slanted, active, readable (which is known to capture simplicity in type), and handwritten/typed (which indicates natural versus machine-made in type) Typeface-specific characteristics included serifs, ascenders, descenders, heavy, repeat, fat, condense, and x-height We analyzed the two groups of characteristics separately to ensure that we identified and linked generalizable dimensions to responses so as to better advance design research across stimuli

We performed EFAs using principal components analysis with Varimax rotation The factor analysis of the universal characteristics revealed three design dimensions, which explain 69 7% of the variance (see Table 3) The first factor, elaborateness, included ornate, depth, distinctive, meaningful, and negative loadings for readable and common (rather than special-purpose) use The second factor, harmony, included balance, smoothness, symmetry, and uniformity The third factor, naturalness, included active, curved, organic, slant, and a negative loading for typed (rather than handwritten) The results are similar to Henderson and Cote's (1998) findings, though we used different design characteristics specified by practitioners A CFA confirmed the appropriateness of the factor structure (CFI = 858) However, in subsequent analyses, we used the EFA results because orthogonal factor scores could be created to examine the relationship between design and response

Factor analysis of the typeface-specific variables also uncovered three dimensions, which explain 60 4% of the variance (see Table 3) Flourish comprised serifs, ascenders, and descenders It might appear that flourish and elaborate would tap the same dimension, however, they were correlated at only 183 Weight comprised heavy, fat, and repeated elements Finally, compressed comprised condensed and x-height Again, a CFA confirmed the appropriateness of the factor structure (CFI = 862), and we used the EFA factor scores for the regression analyses

TABLE 2
CFA of the Response Dimensions

	Pleasing	Engaging	Reassuring	Prominent
Like/dislike	834			
Warm/cold	838			
Attractive/unattractive	855			
Interesting/uninteresting		892		
Emotional/unemotional		886		
Calm/not calm			919	
Formal/informal			880	
Honest/dishonest			921	
Familiar/unfamiliar			916	
Innovative/mainstream			– 826	
Strong/delicate				591
Masculine/feminine				1 000
Correlations Among Response Dimensions				
Pleasing	1			
Engaging	341	1		
Reassuring	607	– 589	1	
Prominent	– 543	– 578	044	1

Notes χ^2 = 536 540, with 48 degrees of freedom, the probability value for the χ^2 statistic is less than 001, the normal theory recursive least squares χ^2 for this maximum-likelihood solution is 447 318 The Bentler-Bonett normed fit index = 806, the Bentler-Bonett nonnormed fit index = 751, and the CFI = 819

TABLE 3
EFA of the Design Dimensions

	Elaborate	Harmony	Natural	Flourish	Weight	Compressed
Distinctive/not distinctive	787	−247	132			
Ornate/plain	780	−334	244			
Special use/common use	−720	449	−180			
Readable/not readable	−711	475	−076			
Conveys meaning/does not convey meaning	687	−081	296			
Depth flat/multidimensional	659	−101	208			
Uniform/not uniform	−213	816	−257			
Balanced/unbalanced	−218	759	−277			
Smooth/rough	−371	693	135			
Symmetrical/asymmetrical	−406	600	−353			
Curved/angular	180	313	804			
Organic/geometric	243	−373	742			
Slanted/straight	116	−215	720			
Looks handwritten/looks typed	−307	431	−718			
Active/passive	380	−503	615			
Serif/sans serif				754	158	008
Ascenders pronounced/not pronounced				720	−226	137
Descenders pronounced/not pronounced				639	−197	156
Heavy/light				−333	771	033
Repeated elements/no repeated elements				307	705	−180
Short and fat/tall and thin				−382	677	397
Condensed/extended				001	−024	−817
x-Height tall/short				281	−017	583

Notes We performed the EFA using principal components analysis with Varimax rotation Elaborate, harmony, and natural explain 69 7% of the variance in the universal design characteristics, and flourish, weight, and compressed explain 60 4% of the variance in the typeface-specific design characteristics

How Do Design Characteristics Influence Responses to Fonts?

We conducted four separate regression analyses using pleasing, engaging, reassuring, and prominent as the dependent variables We used the three universal design dimensions (elaborateness, naturalness, and harmony) and the three font-specific design dimensions (flourish, weight, and compressed) as predictors We first included all the design dimensions in the model We then added nonlinear relationships using stepwise regression We also tested for interactions among the design dimensions, but none were significant Overall, the design dimensions were strongly related to the impressions created by typeface Explained variance was particularly high (the adjusted R^2 ranged from 514 to 734) In addition, both universal and typeface-specific design dimensions influenced response, however, the universal dimensions consistently explained more variance A summary of the regression results is presented in Table 4

Pleasing/displeasing The design dimensions explained 51 4% of the variance in the pleasing/displeasing response factor Elaborate, harmony, natural, flourish, and compressed all had significant effects Natural had the largest effect (ΔR^2 = 320) in creating more pleasing fonts, which leveled off at high values Elaborateness explained 7 9% of the variance and had a negative effect on pleasingness Harmony, flourish, and compressed all had modest effects (ΔR^2 = 045, 039, and 031, respectively) Harmony and flourish both increased pleasingness (harmony was slightly nonlinear in the positive relationship) A curvilinear relationship indicated that moderate values of compressed create the most pleasing fonts

Engaging/boring Design explained a large portion of the variance (68 0%) in the engaging/boring response dimension Natural and elaborate had the greatest effects (ΔR^2 = 268 and 211, respectively), and higher levels of natural and elaborate created more engaging typefaces Harmony was also important and created less engaging fonts (ΔR^2 = 170), though this effect diminished at higher levels of harmony Compressed and flourish had nominal effects (ΔR^2 = 018 and 013, respectively), and both increased the engagingness of the font

Reassuring/unsettling The design elements explained 73 4% of the variance in the reassuring/unsettling response dimension Harmony and elaborate had the most influence, explaining 38 5% and 33 0% of the variance, respectively Harmony made fonts more reassuring, whereas elaborateness made them more unsettling Flourish explained a nominal amount of variance (ΔR^2 = 018) and made fonts more reassuring

Prominent/subtle Natural, weight, flourish, and harmony explained 52 8% of the variance in the prominent/subtle response factor Natural explained the most variance

TABLE 4
Summary of Regression Results

Design Elements	Direction of Effect	Beta Coefficient	Size of Effect (ΔAdjusted R^2)	Total Adjusted R^2
Pleasing				514
Natural	Positive, plateaus at high values	$428 - 138N^2$	320	
Elaborate	Negative, linear	-275	079	
Harmony	∫	$029 + 208H^3$	045	
Flourish	Positive, linear	209	039	
Compressed	∩	$118 - 128S^2$	031	
Engaging				680
Natural	Positive, linear	412	268	
Elaborate	Positive, linear	403	211	
Harmony	Negative at a decreasing rate	$-361 + 0645H^2$	170	
Compressed	Positive, linear	153	018	
Flourish	Positive, linear	126	013	
Reassuring				734
Harmony	Positive, linear	586	385	
Elaborate	Negative, linear	-600	330	
Flourish	Positive, linear	168	018	
Prominent				528
Natural	Increasingly negative	$-436 - 150N^2$	291	
Weight	Positive, linear	329	171	
Flourish	Negative, linear	-220	043	
Harmony	∖	$258 - 229H^3$	024	

(ΔR^2 = 291), more natural fonts were perceived as less prominent and more subtle Weight increased perceptions of prominence and explained 17 1% of the variance Flourish and harmony created less prominent designs, explaining 4 3% and 2 4% of the variance, respectively

Analysis for Developing Guidelines

In addition to conducting regression analyses to assist in developing guidelines for corporations' use of typefaces, we conducted a cluster analysis to assess trade-offs The focus of the cluster analysis was on identifying response profiles that could be achieved through a range of commercially available fonts We built the response clusters using the 12 raw response variables rather than the factors, so as not to lose any richness in the data We determined the number of clusters by examining the average distance between clusters and comparing this with the within-cluster distances In addition, we avoided creating clusters with too few fonts Six clusters appeared to describe the data best Although the creation of additional clusters reduced the distance values within clusters, cluster sizes became small The results and discussion of the cluster analysis, as well as an extended discussion of guidelines for impression management through typeface usage, are presented in the next section

Guidelines for Impression Management

Before we examine specific guidelines for selecting typeface, we discuss several general conclusions that our analysis supports The results provide broad empirical support for the contention by chief executive officers, corporate identity analysts, and creative agencies that typefaces convey various strategically important impressions (Dolen 1984, Hutton 1997, Somerick 2000, Spaeth 1995) Just as a spokesperson projects an image of the company, typeface appears to have the potential to influence the impressions created by corporate communications In addition, the strength of the relationship between typeface design and the resultant impressions (the adjusted R^2 ranges from 514 to 734) suggests that corporations can have significant control over the impressions (all other content issues being equal) Because type is inherent to most corporate communications, companies can cost-effectively leverage the benefits of an appropriately designed typeface

Our findings further reveal that corporations should consider all four responses that their typefaces create Thus, typeface should be carefully selected to ensure consistency with other elements of the corporate identity strategy For example, Hilton redesigned its original logo in a script look to make it more friendly (Spaeth 1999)

From **Hilton** to *Hilton*

Our results show that natural, script typefaces produce more reassuring and pleasing fonts However, Hilton's new font is only average on elaborateness and harmony The combined result is a font that is less prominent (more subtle) and only moderately engaging The change to a script look in an attempt to make a friendlier impression had a more complex effect in that a combination of responses (pleasing, less prominent, and only moderately engaging) resulted Focusing on only a single response may lead to unintended consequences in other types of response. Firms must recognize the implications of design for all responses because multiple responses may be elicited.

Firms not only must attend to the breadth of impressions that result from their font selections but also, in many cases, need to make some trade-offs with respect to the desired responses. Ideally, corporations would be able to create any combination of impressions. However, because the design factors have different effects on impressions, a practitioner's ability to create high values on all four response dimensions is limited. Specifically, elaborate designs increase how engaging the design is, but they decrease how pleasing and reassuring it is. Harmony increases pleasing and reassuring responses but decreases engaging and prominence responses. Last, natural designs are pleasing and engaging but are less prominent. As such, some trade-off between responses appears to be necessary. To illustrate, the change in the Citigroup logo,

from **CITIGROUP** to **citigroup**,

might achieve the company's goal of being "softer, less aggressive, and cozier" (Spaeth 1999, p. 24), but it may also be too uninteresting (i.e., too low on the engaging dimension) and less pleasing. A similar font used in our study (i.e., corporate mono) is reassuring but scored below average on pleasing, low on engaging, and average on prominence.

Common Response Combinations

We draw on the cluster analysis results to illustrate the trade-offs. Among the wide range of commercially available fonts in this study, we found six general profiles (see Table 5). The first cluster comprises pleasing, subtle (not prominent), and engaging fonts that scored average on the reassuring dimension. These fonts are liked, warm, attractive, interesting, emotional, feminine, and delicate (e.g., *Scheherazade*). The means on design dimensions for this cluster confirm predictions from the regression results. Namely, fonts that evoke these responses elicit high harmony and flourish and low weight (see, e.g., the Angelwizard Films logo in Table 5).

The second cluster comprises unsettling but engaging fonts. These fonts are interesting, emotional, exciting, informal, dishonest, unfamiliar, and innovative (Paintbrush). Although most companies do not want to be perceived as unsettling (not reassuring), these fonts communicate an edginess that is of value in many communications efforts. See, for example, Terrwear.com (see Table 5), which produces clothing for mountain biking. Again, the design dimension means for this cluster confirm the regression analysis predictions that fonts that evoke these responses are natural, somewhat elaborate, and lacking in harmony.

The third cluster of fonts is unlikely to be used heavily by corporations. These fonts are displeasing and unengaging (i.e., boring) but score average on the reassuring and prominence dimensions. They are disliked, cold, unattractive, uninteresting, and unemotional (e.g., Chainlink). The cluster means confirm the regression analysis predictions that such fonts are unnatural, score low on compressed, and have little flourish. Even the trade-offs predicted by the regression (elaborate designs are displeasing but engaging, harmony creates boring but pleasing fonts) are consistent with the cluster results. Although these fonts' use in marketing will be limited, there may be some communications situations in which such a font would be used, such as to display the characteristics or claims of a competing brand or to describe undesirable behaviors in nonprofit advertising (e.g., antismoking advertisements). However, some companies may want to produce this type of displeasing image. See, for example, Cleopatra Records (see Table 5), which produces gothic and industrial music albums.

The fourth cluster of fonts is prominent but scores average on the pleasing, engaging, and reassuring dimensions. These fonts are masculine and strong and are characterized by designs with weighty lines (e.g., **NewYorkDeco**), they may also have some elaborateness. It appears that any font can be made to fit this category simply by making it thicker. For example, Canon (see Table 5) uses a fairly simple font with thick lines. Again, the regression results predict that fonts are made more prominent by increasing weight (though the regression results suggest that such fonts are less natural and have less flourish than the cluster analysis suggests).

The fifth cluster of fonts scores low on reassuring (i.e., unsettling), displeasing, and engaging but average on the prominent dimension. Such fonts are interesting, emotional, exciting, informal, dishonest, unfamiliar, innovative, cold, disliked, and unattractive (e.g., **AluminumShred**). Consistent with the regression results, the responses mentioned previously are created by designs low in harmony, below average in naturalness, and above average in elaborateness. As in the third cluster, fonts in the fifth cluster are unlikely to be used heavily by corporations, unless the firms want to convey negative information (e.g., fear-appeal advertising) or to target a niche market. For example, see the logo of Abominable Records (Table 5), which is a punk rock and garage rock record label.

The sixth cluster is highly reassuring but not engaging (i.e., boring). It includes fonts that score average on pleasing and prominent. This cluster contains many common, highly readable fonts (e.g., Georgia). Consistent with the regression results, the fonts in this cluster score low on elaborateness and high on harmony. Such fonts are commonly used in the content of print advertisements and by respected, formal firms, such as law firms and accountants (see, e.g., the logo of Mark Rushing & Associates in Table 5, which conveys the reassuring impression).

The cluster analysis results provide evidence of the trade-offs that are necessary when firms select commercially available fonts. However, further examination of the regression results reveals that new fonts can be created to achieve additional arrays of response profiles. The regression results provide guidance to corporations for enlisting graphic designers to modify existing fonts or to create new, corporation-specific fonts instead of using commercially available fonts that may limit the combination of impressions created. We subsequently discuss guidelines for creating response arrays beyond those we have already described.

TABLE 5
Cluster Analysis Results

Design Profile	Number of Fonts	Responses	Level	Design	Level	Fonts	Examples
1	37	Pleasing Engaging Reassuring Prominent	High High Average Low	Elaborate Natural Harmony Flourish Compressed Weight	Average High Average High Average Low	Scheherazade Informal Roman AncientScript Enviro Pepita MT	Angelwizard
2	37	Pleasing Engaging Reassuring Prominent	Average High Low Average	Elaborate Natural Harmony Flourish Compressed Weight	Above average High Low Average High Average	Baphomet Edda Chiller Stonehenge Paintbrush	TERRWEAR.com
3	21	Pleasing Engaging Reassuring Prominent	Low Low Average Average	Elaborate Natural Harmony Flourish Compressed Weight	Above average Low Average Below Average Low Above average	Playbill Logan Onyx Industria Inline StencilSet	cleopatra
4	41	Pleasing Engaging Reassuring Prominent	Average Average Average High	Elaborate Natural Harmony Flourish Compressed Weight	Above average Average Average Average Average High	NewYorkDeco Bandstand SunSpLash Middle Ages Fisherman	Canon
5	19	Pleasing Engaging Reassuring Prominent	Low High Low Average	Elaborate Natural Harmony Flourish Compressed Weight	Above average Below average Low Below average Average Average	AluminumShred BigDaddy Integrity Ransom Amazon	ABOMINABLE RECORDS
6	54	Pleasing Engaging Reassuring Prominent	Average Low High Average	Elaborate Natural Harmony Flourish Compressed Weight	Low Average High Average Average Average	Georgia Verdana Janson Text Century Gothic Times New Roman Century Schoolbook	MARK RUSHING &ASSOCIATES

TABLE 5
Continued

Design Profile	Number of Fonts	Responses	Level	Design	Level	Fonts	Examples
7	—	Pleasing	High	Elaborate	Average	Maiden Word	Disney
		Engaging	High	Natural	High	**Author**	
		Reassuring	Average	Harmony	Average	**Viner Hand ITC**	
		Prominent	High	Flourish	High		
				Compressed	Average		
				Weight	High		
8	—	Pleasing	High	Elaborate	Low	Hamburger	Hallmark
		Engaging	Average	Natural	High		
		Reassuring	High	Harmony	High		
		Prominent	High	Flourish	Average		
				Compressed	Average		
				Weight	High		
9	—	Pleasing	High	Elaborate	Low	None in data set	Imagination
		Engaging	Average	Natural	High		
		Reassuring	High	Harmony	High		
		Prominent	Low	Flourish	Average		
				Compressed	Average		
				Weight	Low		

Notes We present the Author and Viner Hand ITC in bold to make them more consistent with the design characteristics needed to create a prominence response

Designing Corporation-Specific Fonts

Several strategically attractive response-profile options emerge from our examination of the regression analyses

Pleasing, engaging, and prominent fonts (average reassuring) This combination of responses is similar to that in Cluster 1, except it is prominent rather than subtle As we noted previously, simply making the lines thicker can make any font more prominent (e g , Fluf is much more prominent than the similar Kidstuff) Disney uses this strategy to create a more prominent looking logo than is common for Cluster 1 designs (see Table 5)

Pleasing, reassuring, and prominent fonts (average engaging) The creation of pleasing and reassuring fonts should be fairly easy because no trade-off is required Pleasing fonts are natural and simple, whereas reassuring fonts are harmonious and simple In addition, although harmony does not have a large effect on pleasingness, it tends to be positive The same is true for the effect of naturalness on reassuringness Thus, pleasing and reassuring fonts can be created with natural, simple, and harmonious designs These fonts can become more prominent by simply making the lines thicker (which does not affect evaluations of pleasing or reassuring) It is surprising that none of the fonts in our sample had the design characteristics needed to create pleasing and reassuring fonts All the fonts that scored high in both naturalness and harmony were also elaborate The closest example to the desired font scored high on naturalness but only average on harmony and slightly below average on elaborateness (i e , *Hamburger*) The Hallmark logo is a good example of this type of design (see Table 5)

Pleasing, reassuring, and subtle fonts (average engaging) As we noted previously, it is fairly easy to create pleasing and reassuring fonts To make them subtle as well, the lines should be thin and natural There was no example of this type of font in our sample, and it was extremely difficult to find a corporate example, however, the logo for Imagination Web Design is a good example of this combination (see Table 5)

Font combinations A final option is to combine fonts with different response profiles to create a hybrid response For example, first initials and delimiters might be used to create a sense of pleasingness and subtlety This could be followed by the use of generic fonts to create a reassuring impression For example, the following logo for Elkins & Associates provides a good example of this strategy

ELKINS & ASSOCIATES

Similar approaches might be used to grab attention (e g , engaging first initials) without making the typeface overly unpleasant

Creating Differentiation Through Typeface Design

The nine design profiles of typefaces, along with the possibility of combining fonts from different profiles, provide corporations with great flexibility in achieving communication goals and in creating differentiated marketing materials Even greater flexibility and creativity is afforded to corporations because they may achieve the described design dimensions by manipulating any of the design characteristics that underlie the design dimensions For example, if a corporation chooses to use a natural design to communicate a pleasing, subtle image, it may choose or create a typeface that emphasizes any one of several aspects of naturalness, such as handwriting, curvature, or slant The typeface need not have all characteristics of naturalness to score high on this dimension

Thus, rather than constrain a corporation in its use of typeface, the guidelines serve to direct the already-extensive work that goes into selecting, modifying, and using typefaces to accomplish corporations' goals In addition, by simplifying the myriad characteristics that graphic designers consider into six design dimensions, by simplifying the many impressions that corporations desire into four response dimensions, and by combining these dimensions into nine broad typeface profiles, our guidelines should improve the communication of corporate and brand image goals between executives and their creative partners

Finally, the guidelines should improve a corporation's ability to distinguish itself in meaningful ways from the communications of its competitors Without guidance on the design dimensions and profiles that distinguish typefaces, it would be difficult to determine whether a selected font differentiates the firm from competitors or conveys an identical response profile The guidelines should provide greater insight to both designers and corporations in the audits that they regularly conduct of their competition's communication materials

Creating Integrated Communication Campaigns

The guidelines are useful in creating any type of marketing communication that uses print In addition, the guidelines should assist corporations in creating and integrating their entire portfolio of print communications Corporations are increasingly sensitive to integrating communications across various media Our findings suggest that typeface is a medium with its own message This makes it critical that the font's message and impression be chosen carefully and held consistent across the variety of communications in which a corporation engages In some cases, the firm's preferred font may not be appropriate for a particular medium (e g , a billboard, a Web page) By following the guidelines we have provided, corporations can choose fonts that still have the same response profile This will increase the company's flexibility while increasing the consistency of the messages it communicates Although this would not be appropriate for a brand logo, which must be the same in all communications, it is appropriate for other forms of written communication that a corporation generates

Further Research

Although this study has aimed to provide corporations with guidelines for managing impressions created by their designed materials, more research is needed in the areas of design in general and of typeface in particular Fundamentally, research is needed to determine whether people have an innate, "hardwired" inclination to respond to graphic design in ways that are consistent with their innate responses to the natural world (Colarelli and Dettmann 2003) This research should focus on the consistency with which people respond to design elements across a range of stimuli and purposes Another productive area for further research is the examination of design characteristics and their influence on perception and information processing (e g , Do elaborate fonts attract greater attention and improve recognition and memory? Do elaborate fonts increase cognitive load and require greater processing time?) In addition, further research should establish baseline or control responses to assess whether typeface design enhances or undermines impressions and to determine the degree to which design can hurt or help in achieving desired responses

It is important to determine the impact of the impressions created by typeface on other responses of interest to corporations, such as brand attitudes, customer retention, clickthrough behaviors on Web sites, purchase behavior, and corporate identity Initial research indicates that typeface affects important responses to advertising (e g , Childers and Jass 2002, McCarthy and Mothersbaugh 2002) More research is needed to determine the extent of impression transfer from typeface to the brand and company itself, as well as its impact on the various responses and behaviors studied in marketing

Another avenue of research would be to explore the extent to which responses to typeface and other designed stimuli vary across consumers The approach taken in the current article was a stimulus-level analysis, which is particularly appropriate in marketing, for which efforts are directed at entire segments of consumers Still, research indicates that individual differences can affect attentiveness to aesthetics (Bloch, Brunel, and Arnold 2003) In addition, there may be differences across countries, some countries' orthographies consist of symbols or characters rather than individual letters, which may affect perceptions of letters in alphabetic name brands (Pan and Schmitt 1996) Notably, research indicates that consumers' perceptions of logos are fairly similar in the United States and Asia (Henderson et al 2003), but it is unclear whether this holds with typeface

Research also is needed to determine the public policy implications of typeface selection For example, typeface selection is of special concern in providing information to the elderly Although the focus for the elderly is typically on readability, variables such as engagingness may weigh heavily on the extent to which they read warning labels

More generally, research is needed on the relationship between design and response for other design objects Empirically based guidelines are needed to help corporations manage, in a more informed and strategic way, their entire design portfolio, including products, advertisements, packaging, Web sites, signage, and physical design (e g , retail outlets) The present research and previous research on logos (Henderson and Cote 1998) suggests that there may be universal design dimensions that are generalizable across stimuli In addition, the responses to these designs may be relatively universal and generalizable As such, researchers may identify the beginning elements of examining design impact for other classes of design stimuli and of assessing the further impact of design on a wider variety of responses Such research can only help improve the profitability of design for corporations while providing the basis for a more universal theory of design

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Marketing Science Institute

Linking Marketing to Financial Performance and Firm Value

In January 2002, Donald R. Lehmann, Executive Director of the Marketing Science Institute, submitted a proposal for a *JM* Special Section, "Linking Marketing to Financial Performance and Firm Value." The proposal included activities to promote interactions among marketing academics and practitioners, designed to advance research on this topic. I was excited about the opportunity to stimulate and publish new research, and after extensive discussions, the American Marketing Association and the Marketing Science Institute formally agreed to cosponsor the Special Section. Authors submitted their manuscripts through a paper competition as well as directly through *JM*. Donald R. Lehmann, the Consulting Editor, and a panel of distinguished scholars reviewed every submission. The panel included Tim Ambler, Gregory S. Carpenter, Robert Jacobson, V. Kumar, Roland T. Rust, and Rajendra K. Srivastava. All submissions underwent *JM*'s standard double-blind review process under my editorship, and members of *JM*'s Editorial Review Board served as reviewers. I am pleased to have this opportunity to acknowledge the important contributions of these many individuals: both authors and reviewers. As the subsequent essay suggests, three years' hard work has produced a thought-provoking collection of articles. I hope they will generate further intellectual inquiry and debate about the link between marketing and financial performance in the business community.

—Ruth N. Bolton

Metrics for Making Marketing Matter

Donald R. Lehmann, Consulting Editor

A major trend of the twentieth century was specialization, initially in production and then for activities in general. The functional areas (silos?) that resulted provided great efficiency in specific tasks and facilitated a deep level of knowledge within each function. Unfortunately, this compartmentalization also led to the development of specialized "languages" (a Tower of Babel?), alienation, and integration problems. In the 1980s and 1990s, the pattern of rough equality among functions moved toward hegemony of a single function: finance. The consequence of this was increasing pressure to "meet the numbers" (i.e., deliver strong financial performance). This pressure only increased as the economy turned down and as global competition and the Internet grew.

Whether finance should have attained its current status is not the issue. Indeed, finance and accounting are not perfect. Even excluding the scandals and abuses that marked the beginning of the twenty-first century, the efficient stock market, which is the fundamental tenet of finance, has been badly tarnished, particularly by the growing field of behavioral finance (which essentially is consumer behavior in the financial investments product category). Similarly, financial accounting rarely captures the intangible assets (e.g., customers, brands) that make up the majority of many firms' value. Still, like it or not, it is appropriate to expect accountability from expenditures. Put differently, in general a free market system measures success in currency (e.g., dollars, euros), so business actions are naturally evaluated in monetary terms.

Given this history, it is not surprising that the Marketing Science Institute (MSI) has designated metrics, the measurement of the impact of marketing, as its top priority for the most recent three two-year priority periods (with the short-lived exception of e-commerce for two years). This led to MSI's proposal competition, which produced 111 entries (its largest-ever competition), to two back-to-back conferences in Dallas in October 2001, and to the articles that appear in this special section of *JM*, five of which come directly from the proposal competition. The work herein has many ancestors, most recently Srivastava, Shervani, and Fahey's (1998) conceptual development and Ambler's (2003) detailed discussion. What binds the work together is a focus on evaluating marketing actions and assets in financial terms, not marketing ones.

As Figure 1 suggests, much of marketing has focused its attention on the upper levels of the productivity chain, with line marketing people concentrating on customer or product-market (e.g., sales, share) results. The link to financial outcomes and stock price surprisingly is rarely considered. The consequences of this are predictable. A focus on sales or share and growth per se rather than on profits becomes the center of attention. An obsession about customer image can obscure profit relevance. Firms' maxi-

FIGURE 1
Marketing Productivity Chain

Company Viewpoint	Level	Who Cares?
We do stuff	Marketing actions	Customers
	↓	
Customers do stuff	Customer reaction	Advertising and promotions specialists
	↓	
Stuff happens	Product-market impact	Product managers and chief marketing officer
	↓	
Accounting happens	Financial outcomes	Chief marketing officer and chief financial officer
	↓	
Wealth is affected	Firm value	Chief financial officer and chief executive officer

mization of measured satisfaction is most attainable by concentrating on a small, and often shrinking, segment of customers Even a focus on margin or return on investment (which curiously is often measured by sales/marketing budget) can lead to overconcern about short-term results The point is not that these are bad measures Rather, the point is that to assess performance, they need to be used (primarily diagnostically) along with financial measures and the value of marketing assets that have long-term value, such as brand equity and customers (primarily evaluative criteria)

There are data and methodological limitations that make development of precise estimates of the links in the value chain extremely difficult Indeed, it may be "a bridge too far" to move directly from customer associations to stock price Still, an attempt to lay out such a value chain and to estimate the links seems to be critical This means that there can be no overreliance on a single measure (it is easy to play games with these) or measure du jour, but there need to be metrics at all the levels Put simply, if marketing wants "a seat at the table" in important business decisions, it must link to financial performance Otherwise, by focusing on the measures it is most comfortable with (e g , awareness, attitude, sales), it will continue to lose ground to other areas in fields such as product development (e g , research and development, design) and to devolve into a department of "ad copy and cents-off coupons" (Lehmann 1996) The task is not easy, but the reward is great

In this Special Section, the first article, by Rust, Ambler, Carpenter, Kumar, and Srivastava, is an invited collaboration of five disparate scholars They were recruited to create an overview of the metrics area Private conversations (e-mails) revealed some striking differences in views What resulted is the "mean," a generally sensible work and a nice overview of what we know and what we need to know

The first of the articles from the MSI competition is that by Narayanan, Desiraju, and Chintagunta, who focus on the impact of marketing program spending Specifically, for two different prescription medicine categories, they examine the impact of detailing, direct-to-consumer (DTC) advertising expenditures, and other factors on revenues In some ways, this is a "traditional" study, but it is one that incorporates advanced methods (e g , for dealing with heterogeneity) The results are interesting, suggesting that DTC advertising (but not detailing) influences category sales and that both affect share Several significant interactions exist, and the long-term impact of detailing and DTC advertising are four to five times the short-term impact, which reinforces arguments in support of treating marketing spending as an investment rather than as an expense

The article by Kumar and Reinartz has a different focus, namely, it shows how to use customer lifetime value (CLV) as the basis for evaluating marketing spending (i e , treating CLV as an objective) Their empirical work focuses on a particular company and its channel (particularly Web) strategy The article also demonstrates the usefulness of CLV as a customer selection metric both in competition with and in combination with other bases, such as previous-period purchase

Three articles focus on the impact of strategic choice on financial performance First, Rao, Agarwal, and Dahloff address an ambitious topic, evaluating whether a single (umbrella) branding strategy is superior or inferior to a multiple branding strategy, as measured by stock market performance Using Tobin's q (which is essentially the market value of a firm divided by the book value) as a measure of stock performance, they find that even after controlling for several variables (industry concentration, operating margin, leverage, research and development spending, firm age, number of acquisitions, and growth rate), branding strategy matters More specifically, a corporate branding strategy appears to outperform a "house-of-brands" strategy significantly This is important in its own right and because it suggests, as other researchers have (e g , Mizik and Jacobson 2003), that it is possible to show a link between marketing strategy (rather than spending) and financial and stock performance

Second, Pauwels, Silva-Risso, Srinivasan, and Hanssens examine the consequences of two different marketing approaches (promotion spending and new product introductions) in the automotive industry Using state-of-the-art econometric methods, they link marketing actions to stock market performance, as measured by the ratio of market capitalization to book value as well as revenue and income It is not surprising that both new product introductions and promotions positively affect revenue in the short and long runs However, in terms of income or stock performance, promotion has a negative long-term impact that more than offsets its short-term benefit Furthermore, new product introductions have a weak short-term impact but a strong, positive long-term impact on stock price, especially during new market entry

Third, Lee and Grewal examine the impact of e-commerce strategy on market valuation Specifically, they examine how retail firms' responses to the Internet affect Tobin's q Interestingly, alliances and speed of adoption and integration do not have a direct (main) effect on valuation but rather modify the impact of other variables such as resource slack

Anderson, Fornell, and Mazvancheryl link customer satisfaction, as measured by the American Consumer Satisfaction Index, to shareholder value In a sense, this completes a gradual movement of the satisfaction literature from a focus on measurement per se to financial impact (e g , Anderson, Fornell, and Lehmann 1994), which is the "ultimate" dependent variable Using a version of Tobin's q as a measure, the authors demonstrate a positive link between satisfaction (as well as concentration, share, and weekly advertising) and stock performance, after controlling for industry- and firm-specific factors (advertising-to-sales ratio, share, and industry concentration) More important, the link varies noticeably by industry, it is strongest for department stores, supermarkets, and appliances, and it is weakest for automobiles, apparel, and personal computers Exploration of the reasons for these links, as well as assessment of the cost (compared with the benefit) of increasing satisfaction, would make it possible to optimize spending on satisfaction improvement programs

Overall, it seems reasonable to declare victory in this attempt to assess marketing productivity rigorously Of course, none of the articles are "perfect," which the authors themselves recognize What they are is quite good, and more important, what they do is help open up new avenues of inquiry In particular, it is interesting to note that several of the articles focus directly on stock performance as the criterion for assessing marketing performance, a far cry from measures such as awareness or attitude The hope is that these articles, along with other work in the area, will begin to put marketing on a stronger footing for identifying and defending its successes to those in other areas as well as help eliminate its mistakes

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Roland T. Rust, Tim Ambler, Gregory S. Carpenter, V. Kumar, &
Rajendra K. Srivastava

Measuring Marketing Productivity: Current Knowledge and Future Directions

For too long, marketers have not been held accountable for showing how marketing expenditures add to shareholder value As time has gone by, this lack of accountability has undermined marketers' credibility, threatened the standing of the marketing function within the firm, and even threatened marketing's existence as a distinct capability within the firm This article proposes a broad framework for assessing marketing productivity, cataloging what is already known, and suggesting areas for further research The authors conclude that it is possible to show how marketing expenditures add to shareholder value The effective dissemination of new methods of assessing marketing productivity to the business community will be a major step toward raising marketing's vitality in the firm and, more important, toward raising the performance of the firm itself The authors also suggest many areas in which further research is essential to making methods of evaluating marketing productivity increasingly valid, reliable, and practical

Marketing practitioners and scholars are under increased pressure to be more accountable for and to show how marketing expenditure adds to shareholder value (Doyle 2000) The perceived lack of accountability has undermined marketing's credibility, threatened marketing's standing in the firm, and even threatened marketing's existence as a distinct capability within the firm The Marketing Leadership Council (2001, p 27) reports that 70% of advertising budgets are in decline, compared with 51%, 47%, and 44% for human resources, information technology, and general counsel functions "Having exhausted cost-saving opportunities in virtually every other function," marketing is "next in the line of fire"

There are three challenges to the measurement of marketing productivity The first challenge is relating marketing activities to long-term effects (Dekimpe and Hanssens 1995) The second challenge is the separation of individual marketing activities from other actions (Bonoma and Clark 1988) Third, the use of purely financial methods has proved inadequate for justifying marketing investments Nonfinancial metrics are also needed (Clark 1999, Marketing Science Institute 2000) Indeed, the Institute of Management Accountants (1996) reports the increasing use of nonfinancial measures

This article proposes a broad framework for assessing marketing productivity, describes what is already known about marketing productivity, and suggests areas for further research We conclude that it is possible to show how marketing expenditures are linked to shareholder value Dissemination of the methods proposed in the past ten years to the business community will be a major step toward maintaining marketing's vitality in the firm and, more important, toward raising the performance of the firm itself

A Framework for Marketing Productivity

What We Mean by "Marketing Productivity"

We first need to clarify the ways marketing activities build shareholder value For example, when we talk of marketing "investment," we must identify the marketing assets in which we invest and understand how the assets contribute to profits in the short run and provide potential for growth and sustained profits in the long run In this context, the spotlight is not on underlying products, pricing, or customer relationships (see Webster 1992) but on marketing expenditures (e g , marketing communications, promotions, other activities) and how these expenditures influence marketplace performance The firm should have a business model that tracks how marketing expenditures influence what customers know, believe, and feel, and ultimately how they behave These intermediate outcomes are usually measured by nonfinancial measures such as attitudes and behavioral intentions The central problem we address in this article is how nonfinancial measures of marketing effectiveness drive

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the financial performance measures such as sales, profits, and shareholder value in both the short and the long run

It is important to understand that marketing actions, such as advertising, service improvements, or new product launches, can help build long-term assets (e g , brand equity, customer equity) These assets can be leveraged to deliver short-term profitability (e g , the advertising and promotional expenditures related to stronger brands are more productive) Thus, marketing actions both create and leverage market-based assets It is also important to distinguish between the "effectiveness" and the "efficiency" of marketing actions For example, price promotions can be efficient in that they deliver short-term revenues and cash flows However, to the extent that they invite competitive actions and destroy long-term profitability and brand equity, they may not be effective Consequently, we examine both tactical and strategic marketing actions and their implications

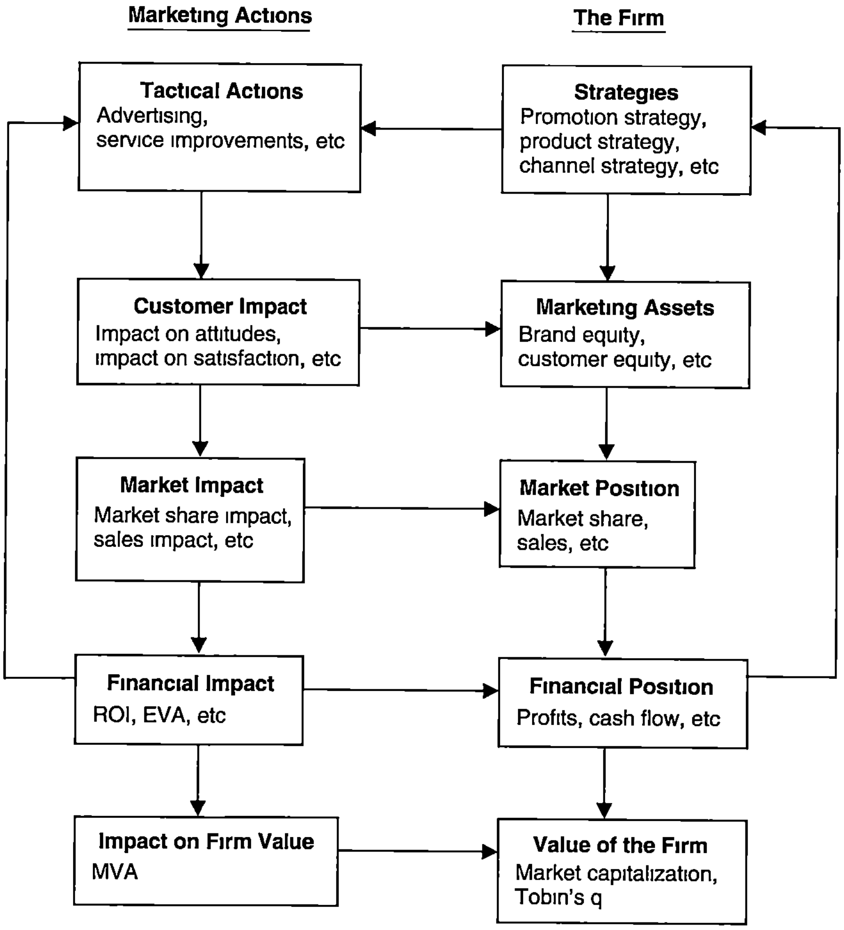
The article is organized around the chain of marketing productivity illustrated in Figure 1 We first discuss the elements of this framework marketing strategies and tactics, their impact on customers, subsequent marketplace consequences and their financial implications, and their impact on the value of the firm We next discuss what we already know about elements of this "marketing productivity chain" as the base for establishing what we need to know before summarizing and drawing conclusions

The Chain of Marketing Productivity

Figure 1 illustrates a broad, conceptual framework that can be used to evaluate marketing productivity It is a chain-of-effects model that relates the specific actions taken by the firm (marketing actions) to the overall condition and standing of the firm We begin at the upper right-hand side of Figure 1, with the firm's strategies, which might include promotion strategy, product strategy, or any other marketing or firm strategy

These strategies lead to tactical marketing actions taken by the firm, such as advertising campaigns, service improvement efforts, branding initiatives, loyalty programs, or other specific initiatives designed to have a marketing impact Because we are concerned with productivity, this article reduces the full range of marketing actions to tactical actions that require marketing expenditure The tactical actions then influence customer satisfaction, attitude toward the brand, loyalty, and other customer-centered elements At the firm level, these customer measures can be aggregated into what we call "marketing assets," which can be mea-

FIGURE 1
The Chain of Marketing Productivity



sured by such indicators as brand quality, customer satisfaction, and customer equity

Customer behavior influences the market, changing market share and sales However, it may also be useful to consider the firm's market position as driven by the firm's marketing assets At any point in time, tactical actions will have made changes in customers' mental states, but they may not yet have influenced the firm's profit and loss account Thus, marketing assets represent a reservoir of cash flow that has accumulated from marketing activities but has not yet translated into revenue They enable the firm to assess the financial impact of marketing (using measures that we describe subsequently) The next section describes the elements of the chain of marketing productivity in more detail

Elements of the Chain

Strategies and tactics Marketing strategy plays a central role in winning and retaining customers, ensuring business growth and renewal, developing sustainable competitive advantages, and driving financial performance through business processes (Srivastava, Shervani, and Fahey 1999) A significant proportion of the market value of firms today lies in intangible off-balance-sheet assets, such as brands, market networks, and intellectual property, rather than in tangible book assets (Lusch and Harvey 1994) The leveraging of intangible assets to enhance corporate performance requires managers to move beyond the traditional inputs and outputs of marketing analysis and to incorporate an understanding of the financial consequences of marketing decisions, which include their impact on cash flows

On a more tactical level, managers implement marketing initiatives to increase short-term profitability In most settings, this effort requires management of margins and turnover Because better value to customers (or superior brands) can be tapped in terms of either price or volume, managers need to trade off prices (and therefore margins) against market share Various programs can be developed to enhance and sustain profitability (e g , loyalty programs, cross-selling, up-selling), how managers proceed is a matter of strategy The question is, What type of expenditure has a greater influence on the value of a firm's customer base a new campaign for advertisements or improvements in the quality of service? How do elements of a coordinated marketing strategy influence the purchase behavior of different marketing segments over time, and how does this affect the firm's revenue streams? What are the disproportionate effects of changes in the structure of pricing on customer acquisition, retention, and cross-buying? How do marketing and operations elements interact to grow or to diminish customer value?

Customer impact To assess the impact of marketing expenditures on customers, it is important to understand the following five key dimensions (adopted from Ambler et al 2002), which can be considered particularly important measures of the customer mind-set

1 *Customer awareness* the extent to and ease with which customers recall and recognize the firm, and the extent to which they can identify the products and services associated with the firm,
2 *Customer associations* the strength, favorability, and uniqueness of perceived attributes and benefits for the firm and the brand,
3 *Customer attitudes* the customer's overall evaluations of the firm and the brand in terms of its quality and the satisfaction it generates,
4 *Customer attachment* how loyal the customer is toward the firm and the brand, and
5 *Customer experience* the extent to which customers use the brand, talk to others about the brand, and seek out brand information, promotions, events, and so on

Because the strength and length of the customer or brand relationship matters (Reinartz and Kumar 2002), the firm must consider multiple aspects of each customer's purchase behavior, not just retention probabilities Consequently, researchers have begun to model other purchase behaviors, such as cross-selling (e g , Kamakura, Ramaswami, and Srivastava 1991), word-of-mouth behavior (e g , Anderson 1998), and profitable lifetime duration of customers (Reinartz and Kumar 2003) These behaviors, at the individual customer level, influence the aggregate level of the marketing assets of the firm

Marketing assets Marketing assets are customer-focused measures of the value of the firm (and its offerings) that may enhance the firm's long-term value We focus on two approaches to assessing marketing assets that have received considerable attention in the marketing literature brand equity and customer equity

The concept of brand equity has emerged in the past 20 years as a core concept of marketing A view of brand equity suggest that its value arises from the incremental discounted cash flow from the sale of a set of products or services, as a result of the brand being associated with those products or services (e g , Keller 1998) For example, Interbrand estimated the value of the Home Depot brand at $84 billion in 1999 (Tybout and Carpenter 2000) Research on brand equity has sought to understand the conceptual basis for this remarkable value and its implications The fruits of this research are changing how people think about brands and manage them Managers have a deeper understanding of the elements of brand equity, of how brand equity affects buyer behavior, of how to measure brand equity, and of the influence of brand equity on corporate value (e g , Aaker 1991, Keller 1998, 2002) It is also important to note that brand equity leads to strength in the distribution channel Thus, we assume that brand equity includes channel effects

Although brand equity takes the brand perspective, customer equity (Blattberg and Deighton 1996, Rust, Zeithaml, and Lemon 2000) takes the firm's customers' perspective Building on previous definitions, we define customer equity as the sum of the lifetime values of all the firm's current and future customers, where the lifetime value is the discounted profit stream obtained from the customer[1] The expansion of the service sector over time, combined with the resultant shift from transaction- to relationship-oriented marketing, has made the consideration of customer lifetime value increasingly important (Hogan, Lemon, and Rust 2002) These events legitimate customer equity (i e , the aggregation of customer lifetime value across customers) as a key metric of the firm Customer lifetime value and customer equity are already in widespread use as marketing asset metrics in some industries, most notably in direct marketing and financial services Customer equity measurement and monitoring is rapidly expanding in other industries as well

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[1] It would be better to differentiate the customer asset, or customer equity, from the value of that asset In common usage, though, the term "customer equity" can refer to both The meaning is usually clear from the context

Market impact Customer impact and the resultant improvements in marketing assets, such as brand equity, influence the firm's market share and sales, thereby influencing its competitive market position These benefits may be viewed as arising from improvements in the intermediate measures (i e , the marketing assets of the firm, Ambler 2000) Superior brands (or superior values provided to customers) lead to higher levels of customer satisfaction and perceived value of the firm's offering The consequences of a superior offering are reflected in many aspects of market performance (Srivastava, Shervani, and Fahey 1998) For example, brands that are better differentiated are characterized by lower price elasticity (Boulding, Lee, and Staelin 1994), have more loyal customers, are less susceptible to competitive actions (Srivastava and Shocker 1991), can command price premiums (Farquhar 1989), can attain greater market shares (Boulding, Lee, and Staelin 1994), can develop more efficient marketing programs because they are more responsive to advertising and promotions (Smith and Park 1992), and can more quickly adopt brand extensions (Dacin and Smith 1994, Keller 1998) The consequences of customer satisfaction also include increased buyer willingness to pay a price premium, to provide referrals, and to use more of the product, lower sales and service costs, greater customer retention, loyalty, and longevity (Hogan, Lemon, and Rust 2002, Reichheld 1996, Reinartz and Kumar 2000), greater market share (Taylor 2002), and greater profitability (Venkatesan and Kumar 2004)

Financial impact Financial benefits from a specific marketing action can be evaluated in several ways Return on investment (ROI) is a traditional approach to evaluating return relative to the expenditure required to obtain the return It is calculated as the discounted return (net of the discounted expenditure), expressed as a percentage of the discounted expenditure Commonly used retrospectively to measure short-term return, ROI is controversial in the context of marketing effectiveness Because many marketing expenditures play out over the long run, short-term ROI is often prejudicial against marketing expenditures The correct usage of ROI measures in marketing requires an analysis of future cash flows (e g , Larréché and Srinivasan 1981, Rust, Zahorik, and Keiningham 1995) It is also worth noting that the maximization of ROI as a management principle is not recommended (unless management's goal is efficiency rather than effectiveness), because it is inconsistent with profit maximization—a point that has long been noted in the marketing literature (e g , Kaplan and Shocker 1971)

Other financial impact measures include the internal rate of return, which is the discount rate that would make the discounted return exactly equal to the discounted expenditure (Keynes 1936), the net present value, which is the discounted return minus the net present value of the expenditure, and the economic value-added (EVA), which is the net operating profit minus the cost of capital (Ehrbar 1998) In each case, the measures of financial impact weigh the return generated by the marketing action against the expenditure required to produce that return The financial impact affects the financial position of the firm, as measured by profits, cash flow, and other measures of financial health

Impact on the value of the firm Managers of publicly traded firms aim to explain and enhance market value/capitalization or shareholder value (Srivastava, Shervani, and Fahey 1998) Linking of marketing actions through customer value to changes in market value (i e , market value-added [MVA]) is essential to this task, but there are differences between change/flow measures and state measures Although measures such as EVA and MVA focus on changes in financial performance, others, such as market capitalization, measure the level of performance

In addition, we can distinguish between forward-looking and retrospective measures Most accounting measures are retrospective in that they examine historical performance In contrast, the market value of firms hinges largely on growth prospects and sustainability of profits (i e , how the firm might be expected to perform in the future) This requires tracking off-balance-sheet metrics (e g , brand or customer equity) and focusing on both current (e g , EVA, cash flow) and expected (e g , MVA, shareholder value) performance

Several measures of the value of the firm rely on measures of stock market performance For example, market capitalization is the market value of all outstanding shares of a firm, and book value is the difference between a firm's assets and liabilities, according to its balance sheet The difference between market value and book value is explained partly by off-balance-sheet assets, such as market-based and intellectual property, and partly by an excess or lack of investor enthusiasm The ratio of market capitalization to the book value (the market-to-book ratio) is sometimes a useful indicator of the strength of marketing assets

Similarly, Tobin's q is the ratio of the market value of the firm to the replacement cost of its tangible assets, which include property, equipment, inventory, cash, and investments in stock and bonds (Tobin 1969) A q-value greater than 1 indicates that the firm has intangible assets Shareholder value is another measure related to economic profit (see Rappaport 1986) Total shareholder return is the cash flow to shareholders through dividends plus the increase in the share price A large proportion of the value of firms is based on perceived growth potential and associated risks (i e , the value is based on *expectations* of future performance) This value may be locked up in marketing assets that can be leveraged to enhance and accelerate current cash flows, and it may enhance the sustainability (reduce the risk) of future cash flows (Srivastava, Shervani, and Fahey 1997, 1998, 1999)

Other Factors

In addition to the previously discussed factors, elements of environment and competition have frequently been shown to be important factors in marketing productivity The firm's skill in adapting to the environment and competition can do no more than improve performance relative to what would otherwise be the case Therefore, it is necessary to view Figure 1 within an envelope of context effects

Environment No firm is an island Performance in general and marketing productivity in particular depend on the environmental and competitive context This is especially true when economic and geopolitical turbulence create unusual amounts of uncertainty The market orientation literature addresses the firm's willingness to pay attention to such market characteristics (Day 1994, Jaworski and Kohli 1993, Narver and Slater 1990) The firm can choose to be proactive (market driving) or reactive (market driven) (Jaworski, Kohli, and Sahay 2000)

Competition The competitive environment has a profound influence on the nature of marketing productivity Marketing expenditure decisions, such as those about advertising, are often made with competitors in mind Studies on advertising spending have identified two separate effects On the one hand, competition can drive marketing spending higher, thus producing an escalation effect (e g , Metwally 1978) Driven by a belief that gaining market share increases profit and enhances firm value (e g , Buzzell and Gale 1987), firms increase marketing expenditures to gain market share, even as rivals do the same Little evidence suggests that the expenditures have the anticipated results For example, examining the brewing industry, Montgomery and Wernerfelt (1991) show that escalating advertising spending destroys value rather than creates it On the other hand, research has demonstrated that (even taking competitors reactions into account) high-market-share brands indeed have an incentive to outspend rivals (e g , Carpenter et al 1988) These findings have fueled the escalation in advertising spending However, the greater wealth associated with the larger share has proved quite elusive

What We Already Know

Chains of Marketing Impact

There already exist several chains of marketing impact Many of them are practical decision models that have been built for actual implementation, typically for specific marketing decision scenarios For example, PERCEPTOR (Urban 1975) tracks product design decisions all the way to market share In the advertising media context, there is a history of models designed to maximize sales or profits, and they usually assume a budget constraint (e g , Gensch 1973, Little and Lodish 1969, Rust 1986) Similarly, there are several models of the influence of sales promotion on business results (e g , Little 1975) The business impact of advertising expenditure decisions historically has been addressed through econometric time-series models (e g , Bass 1969, Eastlack and Rao 1986) The past ten years have witnessed the development of chain-of-effects models of service and customer satisfaction, both across firms (Fornell 1992) and within specific firms (Anderson, Fornell, and Lehmann 1994, Heskett et al 1994, Kamakura et al 2002, Rust, Zahorik, and Keiningham 1994, 1995)

More general chain-of-effects models, which are capable of addressing strategic trade-offs across competing marketing expenditures in general, are much rarer The STRATPORT model (Larréché and Srinivasan 1981, 1982) is an exception It evaluates the business impact of the allocation of resources across strategic marketing alternatives More recently, chain-of-effects models that evaluate competing marketing actions on the basis of their influence on customer lifetime value and customer equity have been developed (Rust, Lemon, and Zeithaml 2004, Venkatesan and Kumar 2004)

Strategies and Tactics

The strategic roles of marketing include setting strategic direction for the firm and guiding investments to develop *marketing assets* that can be leveraged within *business processes* to provide sustainable competitive advantages Although marketing investments (e g , advertising, customer support) and resultant assets are largely intangible, their benefits to the firm are similar to those provided by more tangible resources, such as manufacturing infrastructure Differentiated brands enable their owners to charge higher prices (Farquhar 1989) and to attain greater market shares (Boulding, Lee, and Staelin 1994) Such brands are more responsive to advertising and promotions and have lower selling costs (Keller 1998) Although the role of marketing actions and assets in influencing sales and market share is well documented and appreciated, it is often forgotten that strategic marketing investments also reduce risk For example, research shows that advertising can lead to more differentiated, and thus more monopolistic, brands (i e , brands are less vulnerable to competition) Similarly, investments in brand equity can reduce risks by deflecting competitive initiatives (Srivastava, Shervani, and Fahey 1997, Srivastava and Shocker 1991) Brand equity can also be tapped to reduce marketing expenditures in times of cash flow crunch, thereby reducing risks through "enhanced liquidity" (Srivastava, Shervani, and Fahey 1998)

To deploy suitable strategies and tactics, it is necessary to first try to understand the triggers of customer product purchases A firm's customer database can be used to develop a purchase sequence model that allows for the identification of which customers will buy which products and when, so that the firm can contact customers at the most appropriate time A comparison of this type of customer management strategy with the traditional strategy shows that benefits (i e , profits derived from each individual customer) can be realized by managing on the basis of a 360-degree view of the customer

The implementation of tactics requires resources Each year, the firm allocates resources to contact its customers through various channels, including sales personnel, direct mail, telephone sales, and online However, most of its current contact efforts are (1) targeted at the wrong customers, (2) targeted at the right customers with the wrong offer, or (3) targeted at the right customers with the right offer at the wrong time The primary challenge is to direct resources toward the right customer, with the right offer, at the right time

Regarding specific tactics, every firm is eager to understand the effectiveness of various "touch" points. Touch history refers to any contact that the customer has with the firm. With the advent of e-commerce, most firms use various channels. For example, Charles Schwab Corporation has many ways of touching customers. These are activity-based interactions that can be initiated by the customer or the firm (e.g., Bowman and Narayandas 2001). Touches are not normally considered in reach, frequency, and monetary value models that predict whether an individual customer is "due" (i.e., an alive and active customer of the firm) or "dead" (i.e., a customer who has ended his or her relationship with the firm) to purchase. However, contact strategy can take on greater significance in some industry-based contexts, particularly for services that are provided continuously (e.g., finance, telecommunications) and for durables, for which the typical purchase cycle of a business is long. In other words, in addition to the traditionally employed marketing-mix strategies and tactics, customer touch histories are important in the prediction of customer profitability in the future business cycles (Venkatesan and Kumar 2004).

Customer Impact

We consider two major types of customer impact: (1) impact on a customer's perceptions and attitudes and (2) impact on a customer's summary judgments. The understanding of the psychology of the brand has been deepening over time (e.g., Fournier 1998), and with that comes a clearer understanding of how managerial actions that pertain to the brand affect brand perceptions (e.g., Aaker and Keller 1990; Kamakura and Russell 1991).[2] Specific marketing actions that have been shown to affect brand perceptions include such wide-ranging corporate activities as advertising (Jedidi, Mela, and Gupta 1999) and corporate ethics (Keller 1993). Customer attitudes toward the brand may be usefully divided (from the standpoint of the marketer) into attitudes and perceptions related to value, brand, and relationship (Rust, Zeithaml, and Lemon 2000). Customer perceptions of value are complex and multifaceted (Holbrook 1994), and many theories and studies explore the mechanisms by which marketing actions affect customers' value perceptions (e.g., Bolton and Drew 1991; Dodds, Monroe, and Grewal 1991; Teas and Agarwal 2000; Zeithaml 1988). In recent years, as the business world has moved toward relationships rather than just transactions, the effect of marketing actions on the perceptions of relationship has been shown to be important. Again, a considerable body of research demonstrates the effect of marketing actions on customer attitudes in relationships (e.g., Anderson and Narus 1990; Gummeson 1999; Håkansson 1982; Kumar 1999; Reinartz and Kumar 2002).

Just as marketing actions can influence customer attitudes and perceptions, ultimately they can also affect the customer's summary appraisals, such as customer satisfaction, loyalty, preference, and purchase intention. The nature of satisfaction and loyalty and their drivers have become much better understood in the past 20 years (for an excellent review, see Oliver 1997), with customer expectations and previous experience assuming a central role. Customer preference (e.g., McAlister and Pessemier 1982) and purchase intention (e.g., Fishbein and Ajzen 1975) also have been heavily explored.

Marketing Assets

In the past 10 to 12 years, marketing scholars have greatly expanded their knowledge of these marketing assets and how they contribute to the economic health of the firm. We focus on two prominent types of marketing asset measures: brand equity and customer equity.

Brand equity. Brands have long been recognized as meaningful, powerful symbols (e.g., Levy 1959), but formal analysis began in earnest with Aaker (1991), who describes brand equity as consisting of four components: brand awareness, perceived quality, brand associations, and brand loyalty. Another widely adopted view offered by Keller (1998) describes brand equity as "the differential effect that brand knowledge has on consumer or customer response to the marketing of that brand" (Keller 2002, p. 7). In both models, a brand can be considered a memory node in a network that links the brand to a set of associations. A more powerful brand is more vivid and has a more favorable and easily recalled set of associations, which increases its overall value.

Various nonfinancial methods have been suggested for the measurement of brand equity. One group of these methods measures buyers' knowledge about brands with free-association tasks, projective techniques (e.g., Levy 1985), techniques designed to elicit the metaphorical meaning of brands (e.g., Zaltman and Higie 1995), and methods to measure the structure of associations more explicitly (e.g., Aaker 1997; Keller 1998). Conjoint analysis also provides insight into brand equity by decomposing overall value into value that arises from product attributes and value that arises from brand names (e.g., Rangaswamy, Burke, and Oliva 1993). In contrast, a second group of holistic methods, called "residual approaches," seeks to estimate the value of brand equity by deduction, that is, by estimating the effect of other factors and then attributing the residual impact to brand equity (e.g., Park and Srinivasan 1994). A third group of methods seeks to measure the value of brands by examining various measures of market performance. *Financial World* and Interbrand are two of the best-known commercial measures. In calculating brand equity, Interbrand, the first to offer such a measure, includes data on market leadership, stability, internationality, trends of the brand, support, level of protection, and characteristics of the markets in which it operates (Keller 1998).

Research on the influence of brand equity on market value has received less attention, perhaps because of the widely accepted efficient-markets hypothesis that suggests that there is little role, if any, for brand equity An early effort to measure brand equity used the prevailing finance-based view (Simon and Sullivan 1993) Assuming that a corporation's market value is an unbiased estimate of the future cash flows, Simon and Sullivan (1993) estimate the portion of future cash flow that is attributable to a corporation's brand and derive a financial measure of brand equity Aaker and Jacobson (1994) examine the influence of brand equity on stock returns more directly by modeling the influence of changes in brand quality perceptions and firm ROI on the market value of 34 corporations They find that brand equity has a positive impact on stock returns, as does product quality, thus demonstrating the power of brand perceptions In a subsequent study, Aaker and Jacobson (2001) find that change in brand attitude is positively related to change in stock return in the computer industry In a related study that explores a wider range of industries, Barth and colleagues (1998) examine the changes in the equity of 1204 brands owned by 183 publicly traded corporations from 1992 to 1997 Their analysis shows that brand equity has a positive statistical association with market value, beyond the effect of two traditional measures net income and book value of equity This finding is consistent with other research that suggests that marketing expenditures produce a valuation premium greater than that implied by cash flow (Bowd and Bowd 2002, Kirschenheiter 1997, Srivastava et al 1997)

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[2] There is a long history of research that relates marketing actions to intermediate outcomes, such as customer attitudes, customer satisfaction, and customer preferences. This extensive body of research (of which we can sample only a small portion) encompasses the behavioral, quantitative, and managerial research traditions. There is an even greater body of literature that relates marketing actions to brand perceptions.

Customer equity Customer equity was first identified as a measure of the marketing asset by Blattberg and Deighton (1996), who define a firm's customer equity as the sum of the lifetime values of the firm's customers Customer equity models are characterized by models of the lifetime value of individual customers The early thinking on customer equity arose from the direct marketing paradigm, in which longitudinal data about individual customers and their reactions to marketing efforts (typically promotional mailings) were present (e g , Blattberg, Getz, and Thomas 2001) Related work on the long-term value of customer relationships arose in the financial services arena (e g , Storbacka 1994) and in the high-technology industry (Kumar, Venkatesan, and Reinartz 2002) Because customer equity results from customer lifetime value, methods for assessing the lifetime value of a customer became central Again, such methods typically assumed the existence of longitudinal customer data (e g , Dwyer 1997, Libai, Narayandas, and Humby 2002, Reinartz and Kumar 2000) This stream of work evolved from measurement of customer lifetime value to evaluation of the influence of marketing effort on customer equity (Berger et al 2002, Hogan, Lemon, and Rust 2002), thus incorporating an assessment of marketing decisions over time Because of the data requirements, this approach has largely been restricted to a handful of business scenarios (e g , direct marketing, subscription sales, financial services, business-to-business) and a handful of marketing variables (e g , direct mailings, salesperson contacts, telephone sales, price)

More recently, a different approach has emerged that expands the industries and the set of marketing actions to which customer equity may be applied (Rust, Lemon, and Zeithaml 2004, Rust, Zeithaml, and Lemon 2000) This approach combines internal company information, customer survey data, and one-step-ahead purchase information gathered either from panel data (if available) or from a survey Analogous to "driver analysis" in customer satisfaction measurement (e g , Johnson and Gustafsson 2000, Rust, Zahorik, and Keiningham 1994), drivers of customer equity are obtained and statistically related to purchase behavior, and inertia from purchase to purchase is incorporated (Guadagni and Little 1983)

Market Impact

Market impact models have mostly arisen in the quantitative research tradition Such models typically have sought to relate market expenditures over time to effects on such variables as market share and sales Many comprehensive reviews exist of market impact models (for excellent reviews, see Hanssens, Parsons, and Schultz 1990, Kumar and Pereira 1997, Lilien, Kotler, and Moorthy 1992)[3] An important lesson from these studies is that long-term impact is very different from short-term impact (e g , Dekimpe and Hanssens 1995) For example, some marketing actions (e g , sales promotions) take effect quickly but have little lasting influence, whereas other marketing actions (e g , service quality improvements, advertising) accumulate their influence over time This important distinction reinforces the importance of considering the impact on discounted profit flows over time rather than simply investigating short-term effects Furthermore, the firm's ability to track competitive actions and to react appropriately to them moderates the effects of the environment and competition, so that firm capabilities and context effects become more important in the long run (Kumar 1994, Narver and Slater 1990)

Financial Impact

Although changing customer attitudes, perceptions, and intentions are important, and achieving improved sales and market share is essential to any marketing effort, many managers consider financial impact the most crucial measure of success for any marketing effort Financial impact involves not only the increase in revenues but also the expenditure required to produce that increase Marketing expenditures are considered investments, and the financial return is measured as ROI The long-standing recognition of the importance of ROI in evaluating more general marketing expenditures (Kirpalani and Shapiro 1973) led to early methods for measuring advertising ROI (Dhalla 1976) The connection between marketing efforts and financial performance was subsequently reinforced by analysis of the PIMS company database, which indicated a positive relationship between market share and the firm's aggregate return on net assets (Buzzell and Gale 1987), though that relationship was later challenged on methodological grounds (Jacobson and Aaker 1985) Gale (1994) recanted and later proposed that market share and financial performance were both driven by product quality, though the link between perceived and actual quality is itself complex

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[3] In many cases, the number of market impact studies is so large that there exist data analyses to summarize the totality of research evidence For example, Assmus, Farley, and Lehmann (1984) provide a meta-analysis of the findings that relate advertising to sales and find that advertising has variable effectiveness A 1995 special issue of *Marketing Science* summarizes many of the generalizations involving the relationship between marketing actions and marketing impact

More recently, the "return on quality" model has provided a methodology for projecting a firm's ROI in service quality (Rust, Zahorik, and Keiningham 1994, 1995) Research has shown that there may be trade-offs between service quality improvements that increase revenue and those that reduce costs (Anderson, Fornell, and Rust 1997, Rust, Moorman, and Dickson 2002) Approaches to evaluating financial return have also begun to consider the element of financial risk (Davis 2002, Hogan et al 2002), as is common in corporate finance

Impact on the Value of the Firm

Analyses that link market-based assets and marketing actions to shareholder value, though rare, are beginning to emerge The evidence is encouraging on many fronts For example, Lane and Jacobsen (1995) show that brand extension announcements lead to abnormal returns on stocks (i e , returns in excess of those predicted by changes in the market index), thus establishing a link between marketing activity and stock price Kim, Mahajan, and Srivastava (1995) show a strong relationship between the net present value of cash flows attributable to growth in the number of subscribers (customer base) and stock prices in the cellular telephone industry Likewise, Ailawadi, Borin, and Farris (1995) demonstrate the impact of marketing actions on EVA and MVA through customer value measures, and they provide a direct link between marketing strategy and changes in a firm's financial fortunes

Srivastava and colleagues (1997) show that brand equity reduces financial risk and is related to a lower cost of capital and thus to higher market capitalization, whereas Demers and Lev (2000) show that Web site characteristics measured by Nielsen/Netratings, such as stickiness, reach, and loyalty, were correlated with share prices in both 1999 and 2000 Brand reputation (equity) has been shown to be a durable asset that can help reduce the risk of future cash flows for its owners (Deephouse 2000), and customer profitability has been linked to market capitalization for several Internet firms (Gupta, Lehmann, and Stuart 2001) These studies notwithstanding, efforts to link marketing actions to firm performance are few and far between, and more such work is needed

Other Factors

Environment Slater and Narver (1994) find limited support for the notion that the competitive environment moderates the market orientation–performance relationship They argue that the benefits of market orientation are long-term, whereas contextual factors are transient Harris (2001, p 33) also finds little relationship between market orientation and both subjective and objective measures of performance, except that "under specific moderating environmental conditions, market orientation is associated with both measures of performance" Pelham (1999) finds that market orientation has a greater influence on small manufacturing firm performance than on industry environment and firm strategy selection, though market turbulence may be a moderating factor Greenley (1995, p 7) finds that "for high levels of market turbulence, market orientation is negatively associated with ROI, while for medium and low market turbulence, market orientation is positively associated with ROI" Given all these studies, market orientation remains a strong determinant of performance and, by inference, marketing productivity However, within that, turbulence is a moderating factor "In cases where the market is highly dynamic in nature, consistency may be more important than market responsiveness" (Harris 2001, p 35)

Competition As we discussed previously, investments in marketing assets, such as brand equity and customer equity, make the firm less vulnerable to competition and directly influence the firm's performance (through market share and sales) First, when the product is associated with a high-equity brand, customers evaluate a product more favorably, believe it to be of higher quality, are more likely to purchase it, and have more confidence in it (e g , Larouche, Kim, and Zhou 1996) Second, customers are less price sensitive and more responsive to marketing communications spending for high-equity brands (e g , Simon 1979), thus, marketing expenditures with respect to the competition are effectively leveraged Third, brand equity can create asymmetries in competition that favor high-equity brands For example, price cuts or increases in advertising spending draw market share disproportionately from low-equity brands (Carpenter et al 1988), and competitive imitation by low-equity, me-too brands can increase the share of high-equity brands, such as those of pioneers (Carpenter and Nakamoto 1989) Combined, these forces create important competitive advantages that arise from marketing expenditures on brand equity

What We Would Like to Know

In this section, we explore areas in which current research is insufficient, and we suggest fruitful areas for further progress, especially focusing on the application of marketing productivity measures in the business world

Chains of Marketing Impact

Few methods currently exist for comprehensively modeling the chain of marketing productivity all the way from tactical actions to financial impact or firm value Event studies exist that relate tactical actions directly to firm value, but without modeling the intervening steps (e g , Agrawal and Kamakura 1995), a black-box approach limits insight and understanding There are many opportunities for firm-level research For example, how do firm strategies (e g , promotion strategy, product strategy) influence the firm's brand equity and/or customer equity? How do the firm's market assets relate to firm value and market capitalization (e g , Gupta, Lehmann, and Stuart 2001)? How does a firm's customer equity affect its long-term market position, financial position, and market capitalization?

A larger question is, Why does linking marketing assets to capitalization matter? A firm contemplating an acquisition would be interested in this linkage, but this article focuses on assessing marketing productivity Thus, a more challenging issue may be reconciling the short- and long-term approaches Short-term approaches involve the measurement of the marketing asset, whereas long-term approaches require forecasts of future cash flows The difficulty of such a reconciliation is that future cash flows are the product both of marketing actions to date and of marketing actions to come

Strategies and Tactics

Strategies Several ongoing research agendas continue to be important For example, how does the relative importance of marketing assets vary as a function of the characteristics of the firm's industry, customer markets, product or service offerings, and competitive strategy? Can these assets be leveraged to provide strategic options? How are marketing and intellectual assets interlinked with other functional resources in creating customer value and competitive advantages (e g , through core business processes such as product innovation, supply chain management, and customer relationship management)? What is marketing's contribution in managing core business processes? For example, rather than considering marketing research an expense, can the value of market intelligence be assessed in terms of more efficient supply chain processes? Can strong competitive advantages exist in the absence of strong marketing assets? How can these advantages be leveraged to provide marketplace results that fit with company strategy (e g , when might brand equity be leveraged to opt for a price premium, and when would a share premium be more appropriate?)?

Tactics New technologies have opened up new channels for customer–vendor interactions (e g , cable, Internet), which increases the need to manage integrated marketing communications These developments have led to a critical and immediate need to identify the levels of marketing expenditures for each channel (given expected revenues from customers) that provide firms with maximum opportunities for customer acquisition, retention, and cross-selling, as well as an opportunity for disintermediation Differences in efficiency across various channels might be captured by the sales response functions in order to identify optimal resource allocations within and across channels Similarly, firms might rely on long-term customer profitability models to guide direct marketing initiatives These models should enable firms to improve marketing efficiency Research that assesses the influence of marketing and communications tactics on multiple measures of customer, market, and financial impact would also be useful

Customer Impact

Given extensive prior research that relates traditional marketing actions to customer attitudes, preferences, and intentions, further progress in these areas is likely to be incremental rather than groundbreaking Instead, it is important to model *which* customers are going to buy, *what* products they are most likely to buy next, and *when* they are going to buy the product of highest affinity In other words, the most fertile area for research on customer impact pertains to how customer behavior (rather than attitudes or intentions) responds to changes in marketing actions (Kumar, Venkatesan, and Reinartz 2002) In addition, there is a need to extend such research to explore these questions for new marketing phenomena and in new environments For example, there is much yet to be learned about how the Internet environment affects the customer In general, increased communications and computation capabilities change the nature of the relationship between the marketer and the consumer in ways that are not yet fully understood Similarly, the changing geopolitical environment (e g , terrorism, sense of risk) may influence the market in unprecedented ways In the United States, the persistence of multiple cultures in the society may also change how marketing efforts influence customer attitudes and preferences In summary, a broader understanding of customer impact is likely to result from studying customer behavior in response to new phenomena and in new environments

Measuring Marketing Assets

Brand equity Existing conceptualizations of brand equity have made fundamental contributions to the understanding of brands However, further conceptual development of key constructs, such as brand knowledge, is crucial for developing better measures of brand equity Brand dynamics are another important, difficult issue that has received little attention (a notable exception is the work of Keller and Aaker [1993]) Specifically, brands evolve, which changes the fundamental nature of their equity How should a brand evolve? What are the means of change? When and how should multiple brands be consolidated? These and other questions remain largely open Most firms manage multiple brands, which raises important issues for their launching new products, seeking to grow profits, or cutting costs, and these issues have received little attention (for more commentary, see Keller 2002)

Customer equity Bell and colleagues (2002) identify two important areas for further research in customer equity First, there is a need to build individual-level, industrywide customer databases in industries that do not currently have them (i e , most industries) Without such data, true longitudinal data analysis of customers' behavioral responses to marketing actions cannot be implemented Second, there is a need to develop models of customer lifetime value that maximize, not just measure That is, it is important to determine precisely how much money to spend on each strategic alternative When longitudinal customer data are not available, businesses must adopt survey-based research methods It would be useful to validate the effectiveness of such approaches longitudinally Does customer lifetime value and customer equity, on average, turn out to be as predicted? What adjustments and refinements to the existing models are necessary?

Market Impact

Research on marketing resource allocation (e g , Mantrala, Sinha, and Zoltners 1992) suggests that (1) marketing managers need to optimize investment-level decisions and the allocation of resources across submarkets or customer segments to maximize profitability and that (2) interaction between different marketing-mix instruments could lead to differential allocation of resources across marketing channels As technology progresses, these challenges are magnified For example, improved communications and computational capabilities greatly extend the marketer's ability to target individual customers Thus, market impact models increasingly need to be based on individual customer response rather than on aggregate response, which makes them more complex and computationally intensive Future models of marketing impact may need to employ computational methods (e g , simulation) more and analytical methods (e g , closed-form game theoretic equilibriums) less

Financial Impact

The purest investigations of financial impact involve longitudinal data sources, which means that the construction of customer-level longitudinal data will be a priority, especially in areas in which such data currently do not exist Ideally, such data sets will include not just one firm's customers, but all the customers in the industry (or a probability sample of the customers in the industry) In addition to the scientific investigation of marketing productivity (or other measures of financial return), practical productivity tools are needed that firms can use when they do not have access to customer-level, industrywide, longitudinal data These tools need to reflect the state of current knowledge about how marketing productivity works, and their longitudinal validation is required for eventual widespread practical acceptance

Impact on the Value of the Firm

A strong contender for assessing the value of marketing actions and assets appears to be the shareholder value framework, which includes such variables as the acceleration and enhancement of cash flows, reduction in the volatility and vulnerability of cash flows, and growth of long-term value (Srivastava, Shervani, and Fahey 1998, 1999) However, many questions remain unanswered Is such value recognized by the stock market and reflected in market-to-book ratios and price-to-earnings multiples? Will larger customer-installed bases or better supply chains and value networks command higher price-to-earnings multiples and market-to-book ratios in mergers and acquisitions activity? Will the stock market reward firms for acquiring other firms with high levels of intangible, market-based assets?

Marketers have made considerable progress in examining the financial implications of their actions on the value of the firm Indeed, there is the tendency to have the mind-set that customers are assets and to regard the value of the firm in terms of metrics such as (stock) price per subscriber Strictly speaking, customers are not assets because assets must be owned by the firm The day firms conclude that they own customers is the day they presume too much Customer loyalty must be earned However, it is fair to state that the customer franchise or the customer base is a marketing asset Metrics such as customer lifetime value and price per subscriber, especially positive trends in such measures, help emphasize marketing's contribution to the firm

Other Factors

Much work remains to understand how competition and environment influence firm value Efforts so far have focused on modeling the influence of brand equity on buyer response to marketing spending, such as advertising, to deduce the competitive advantage associated with brand equity (e g , Brown and Stayman 1992) Models that incorporate competitive effects would provide two types of new insights First, they would require modeling of the influence of marketing spending on brand equity in a competitive context, which would be valuable indeed Second, they would require more explicit representations of how brand equity influences firm performance, accounting for the influence of firm expenditures on brand equity itself The building of such models is challenging, requiring the capture of both competitive effects and brand dynamics Competitive models have a long tradition in marketing (e g , Cooper and Nakanishi 1988), and important advances have been made in modeling dynamics (e g , Dekimpe and Hanssens 1995) Consideration of both in the same framework may offer valuable new insights

Summary and Conclusions

Billions of dollars are spent every year on marketing As firms struggle to produce ever-higher profits in increasingly competitive environments, calls to justify their expenditures are growing Existing financial metrics have proved inadequate, leading to the development and increasing use of nonfinancial metrics Over the past decades, but especially in the past 15 years, considerable progress has been made in developing nonfinancial measures of marketing assets In this article, we have attempted to bring such methods and measures together in a unified framework and to present them as part of a comprehensive view to describe marketing expenditures on sales, profit, and shareholder value

The framework we have proposed separates marketing actions, including strategies and tactics, from the overall condition of the firm, as reflected in its assets (including brand equity, customer equity, market position, financial position, and firm value) Only two systems address the important issue of linking short- and long-term outcomes financial and nonfinancial The first is based on forecasting long-term outcomes and discounting cash flow (e g , customer equity) The second represents the future in the state of the marketing asset today Whether the marketing asset is measured financially or nonfinancially, the long-term picture is provided by the performance of this changing asset and the bottom line

Our discussion identifies exciting new directions for research in at least seven areas (1) strategies and tactics, (2) brand equity, (3) customer equity, (4) market impact, (5) financial impact, (6) the environment, and (7) competition A common theme across most of the areas is a greater emphasis on aggregate-level models that link tactics to financial impact Such models would need to be dynamic and comprehensive but have the potential to yield great insight Another common theme is the need to account for customer heterogeneity For example, identification of high-profit customers is a central issue to market segmentation, strategic marketing, and tactics, among other areas Another common theme is dynamics and competition The nature of firm performance is fundamentally affected by competition, and it fundamentally changes over time The capture of both dimensions is essential in virtually every area of marketing productivity measurement Much work remains

Despite the opportunities that exist, our review suggests that there currently is a wealth of means to measure marketing productivity Powerful methods exist to assess marketing tactics, to model the market impact of marketing expenditures, and to assess marketing assets, market position, the value of the firm, and its financial position These methods reflect the considerable progress that has been made in the past 15 years, and they provide a foundation for exciting further work More important, these powerful methods provide the tools necessary to affect the practice of management, to bring greater credibility to marketers, and to further advance marketing science and practice by bringing a long-sought understanding of the impact of the billions of dollars that are spent every year on marketing activities

If there is one conceptual take-away from our review, it is that the evaluation of marketing productivity ultimately involves projecting the differences in cash flows that will occur from implementation of a marketing action In contrast, from an accounting standpoint, decomposition of marketing productivity into changes in financial assets and marketing assets of the firm as a result of marketing actions might be considered The devotion of more attention to these marketing assets is likely to transform the way businesses are managed

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Sridhar Narayanan, Ramarao Desiraju, & Pradeep K. Chintagunta

Return on Investment Implications for Pharmaceutical Promotional Expenditures: The Role of Marketing-Mix Interactions

The authors empirically explore the revenue impact of marketing-mix variables and their interactions. The findings include the following: pharmaceutical direct-to-consumer advertising and detailing (sales force) affect demand synergistically, detailing raises price elasticity, and detailing has a higher return on investment than does direct-to-consumer advertising. The authors also discuss other implications and provide future research directions.

In recent years, there has been explosive growth in direct-to-consumer advertising (DTC) by pharmaceutical manufacturers. Pharmaceutical DTC expenditures varied from slightly less than $1 billion in 1996 to $2.5 billion in 2000. Compare that with expenditures on detailing (i.e., sales representatives "detail" physicians in their offices), which have increased from $8 billion in 1995 to only approximately $9 billion in 2000. Industry sources predict that by 2005, DTC spending will reach $7 billion. It is widely recognized that such growth was partially fueled by a change in the Food and Drug Administration's (FDA) policy toward DTC.[1]

However, no matter how many patients DTC may induce to walk into a physician's office, if a physician says no to a request for a specific medicine, significant advertising dollars have been potentially wasted. Given this, drug manufacturers are struggling to measure the cost effectiveness of their multimillion-dollar DTC campaigns. For example, according to Lee Weinblatt, chief executive officer of PreTesting, an advertising consultancy company in Tenafly, N.J., "Over 80% of our clients are questioning the efficiency of their consumer advertising" (PreTesting.com 2004).

Identifying marketing investments that generate a proven return on investment (ROI) is now a main concern for companies because such investments take funding priority over ones made on faith (see, e.g., Lehmann 2002). Moreover, firms are being urged to understand any synergy among the various elements of the marketing mix, such as detailing and DTC, in order to leverage the impact of such interactions. As Gatignon and Hanssens (1987, p. 257) point out, the optimal resource allocations that arise from models that account for marketing-mix interactions can be significantly different from those inferred from, for example, constant elasticity models.

Intuitively, if there were a positive, synergistic effect between DTC and detailing, it would be valuable to employ both simultaneously. However, if there were negative interactions, it might benefit firms to limit the overlap among the mix elements and perhaps devote more resources to the one that has a better return on the dollar. The arguments for examining interaction effects between detailing and DTC also hold for interaction effects between other promotional activities and between price and any other element of the marketing mix.[2] For example, with respect to the latter, if greater advertising reduces (raises) price sensitivity, it enables firms to raise (lower) prices.

However, although academics have had a long-standing interest in understanding the effectiveness of marketing activities, limited attention has been devoted to the study of interactions among the elements of the marketing mix. For example, researchers have investigated the role of price × advertising interactions (for an overview, see Kaul and Wit-

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[1] From the 1970s to the early 1990s, the pharmaceutical industry communicated with consumers mainly through nonbranded public service announcements. During that period, the FDA required that DTC advertising mention a specific indication for a brand name drug and include a brief summary of side effects and adverse reactions from the FDA-approved label. In 1997, the FDA relaxed restrictions on the content of DTC, essentially making the advertisements considerably less expensive to broadcast.

[2] These include interactions between meetings or events and detailing and meetings or events and DTC.

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tink 1996), but little is known about the interactions among the various marketing-mix elements that are at the disposal of companies (e.g., in the pharmaceutical industry, these include price, detailing, DTC, and other marketing efforts [OMEs] such as journal advertising, meetings, and events). Our search of the literature, which spans a few decades, identified only eight studies that examine marketing-mix interactions at the aggregate level (see Table 1).

Similarly, after reviewing 320 empirical studies on the determinants of (firms') financial performance, Capon, Farley, and Hoenig (1990, pp. 1144, 1159) make the following observations: "Only a handful of studies made an explicit attempt to model interactions among the causal factors," and "There may be synergies (positive and negative) leading to various optimal combinations.... [W]ork on interaction of causal factors is badly needed if the analysis is to move towards optimal allocation of resources among controllable variables."

Analogous sentiments are shared by other researchers in related contexts; for example, Blattberg, Briesch, and Fox (1995, p. G125) note: "Few empirical results have been generated regarding the synergies between feature advertising, displays, and price discounts" (for a recent review of that literature, see Lemon and Nowlis 2002). In summary, an understanding of whether marketing-mix elements such as DTC and detailing have a positive or negative synergistic effect appears to be important and warrants research attention.

To that effect, our empirical analysis focuses on two questions: First, are there any significant interaction effects between pairs of marketing-mix elements? For example, is the impact of detailing enhanced by DTC? Second, if there are interaction effects, what is their likely impact on revenues?

The latter question is relevant because previous academic research has largely been concerned with measurement (e.g., estimated demand elasticity, lagged effects of advertising), and the link to revenues (or other measures of financial performance) has rarely been made (see, e.g., Leeflang et al. 2000; Little 1979). There are two exceptions, both sponsored by the Association of Medical Publications: the work of Neslin (2001) and Wittink (2002). The main goal of these studies is to explore the "average" or "median" impact (across categories) of medical journal advertising along with DTC, detailing, and other promotional expenditures. Given the relatively large amount of data (e.g., Neslin analyzes monthly data from 391 brands), it is quite challenging to characterize the interaction effects among promotional expenditures in these studies (see, e.g., Wittink 2002). A common observation across the two studies is that the ROI for DTCs is quite low.

In a complementary way, our empirical analysis examines the second-generation antihistamine category of drugs. In addition, to assess the extent of our results' category specificity, we analyze antiviral drugs that treat genital herpes. These two categories span the range from extensive use of DTC (antihistamines) to more limited use (antivirals), and they help ensure that the qualitative nature of our results is not driven entirely by the fact that antihistamines constitute a category with significant DTC.

Overall, the distinguishing features of our article are the following: (1) We explore the full range of interactions between pairs of marketing-mix elements and determine their differential impact on category sales and brand shares in two distinct prescription drug categories, (2) we assess the financial implications of detailing and DTC expenditures by providing ROI measures, and (3) we measure the impact of the interactions between marketing-mix elements both on the ROIs for detailing and DTC and on the price elasticities.

The rest of this article is organized as follows: In the next section, we review the relevant literature. The subsequent four sections discuss our model, the data, estimation-related issues, and the results, respectively. The penultimate section summarizes the managerial implications of our analysis, and the final section concludes with directions for further research.

Relevant Literature

Two main streams of research are relevant to our analysis: (1) research on the interaction between marketing-mix elements and (2) other research that examines pharmaceutical promotional spending. We discuss each of these subsequently.

The impact of detailing and DTC can be simply additive. Two recent studies (Neslin 2001; Wittink 2002) report such a possibility. Neslin (2001) uses monthly data from

TABLE 1
Prior Research on Interactions Between Marketing-Mix Elements

Article	Interactions Examined	Effect
Lemon and Nowlis (2002)	Feature advertising × price cut Display × price cut	Depends on price tier
Azoulay (2001)	Advertising × sales force	Negative
Rizzo (1999)	Advertising × price	Negative
Mela, Gupta, and Lehmann (1997)	Advertising × nonprice promotions	Positive
Gatignon and Hanssens (1987)	Advertising × sales force	Positive
Parsons and Vanden Abeele (1981)	Sales force × samples	Positive
Swinyard and Ray (1977)	Advertising × sales force	Positive
Kuehn (1962)	Advertising × product quality	Positive

Notes: The research listed here does not focus on interactions that involve price. For research that focuses on price × advertising interactions, see Kaul and Wittink (1996).

391 branded products from various pharmaceutical categories and, for a "median" brand, estimates the impact of detailing and DTC on the number of prescriptions written by physicians[3] He finds that the ROI for $1 of detailing is $1 72, and the corresponding ROI for DTC is $ 19[4] Wittink (2002) expands on this analysis by considering more data points and by distinguishing between the size of the brands and their launch date in characterizing the average response to promotional investments Wittink also finds considerable difference between the ROIs of detailing and DTC, for example, for brands that have at least $500 million in annual revenues and that launched between 1998 and 2000, ROI for detailing is $11 60 and $1 30 for DTC[5]

Benchmark estimates, such as the preceding ones, obtained from pooling the data across a variety of pharmaceuticals are valuable to the understanding of the impact of promotional expenditures on market response It is important to extend such research by exploring whether the results, articulated in terms of a median (or average) drug, apply to specific product-markets Our study provides such an exploration

In contrast to the additive effects we have outlined, other extant research finds evidence for synergies between marketing-mix elements (for a list of such studies, see Table 1) For example, Swinyard and Ray (1977) find that advertising's effectiveness is enhanced when it follows a personal selling encounter However, there is also evidence in the literature of a negative interaction between detailing and DTC (e g , Azoulay 2001), this effect is referred to as "jamming" The premise of the argument is that detailing typically is a scientific source of information for physicians and that DTC swamps the positive effect, perhaps when physicians generate counterarguments to the claims in the advertisements

Overall, the conclusions in extant research appear to be that the net interaction effect between detailing and DTC can be positive, nonexistent, or negative Kaul and Wittink (1996) report evidence for both positive and negative interactions between price and advertising As we have noted, the interactions also have important managerial implications In this article, we explore the full range of possible interactions between pairs of the various marketing-mix elements

Several researchers have estimated demand functions of oligopolistic branded products in various pharmaceutical subcategories (e g , Berndt et al 1997, Chintagunta and Desiraju 2004, Rizzo 1999) Although the demand model herein is similar to that in the work of Chintagunta and Desiraju (2004), our study differs in three important ways First, we allow for a comprehensive set of interaction effects among the various marketing-mix elements In contrast, Chintagunta and Desiraju focus on the strategic interactions among multimarket competitors in several countries Second, the antidepressant category that Chintagunta and Desiraju examine does not have significant DTC expenditures for the data duration of their study In contrast, we investigate two different product categories (antihistamines and antivirals) that have various degrees of DTC investment Consequently, we account for the effects of DTC Third, we explicitly include carryover effects of marketing activities in the analysis

Two other related studies are also worth noting those of Rosenthal and colleagues (2002) and Wosinska (2002) Both studies consider DTC's impact on demand Rosenthal and colleagues find that 9% to 22% of category growth can be attributed to DTC However, the focus of their study is not on profitability implications, furthermore, because of data limitations, they treat promotional spending as a simple flow and do not consider carryover effects Wosinska uses a large panel of insurance prescription claims (Blue Shield of California) for cholesterol-lowering drugs and empirically makes two observations First, DTC affects only the market shares of drugs on the formulary (i e , the approved drug list), even for such drugs, the marginal impact of DTC on demand is lower than the marginal impact of detailing Second, as we do, Wosinska finds that the impact of DTC is lower than that of detailing In addition, we estimate the interaction between DTC and detailing and the profitability implications We now discuss the various elements of our model

Model

In discussing the model, we refer to the antihistamines product category for expositional convenience We decompose the sales of each of the focal brands in a given period as the product of the category sales and the share of that brand Category sales denote the number of prescriptions of all antihistamines (for both the focal brands and other antihistamines) in that period Category sales are a function of category-level marketing activities and variables that account for product diffusion over time The conditional share equation reflects the share of each of the three focal brands and a fourth "brand" that represents all the other antihistamines available in the market We use a linear sales model for category sales and a discrete choice model for brand share This hybrid model is appropriate for various reasons, which we discuss subsequently

First, the category-level sales specification enables us to model category-level diffusion and the marketing activities' role in the process It has been suggested in prior research (Wosinska 2002) that marketing activities such as detailing and DTC play a different role in category sales and brand switching A goal of our study is to investigate the differential effects, in particular, we aim to explore the hypotheses that DTC is the primary marketing activity that drives category expansion and that detailing is the primary marketing activity that drives brand switching

Second, a discrete choice model is particularly appropriate for modeling brand shares in our problem because physicians make a discrete choice from the available drugs Our discussions with industry experts revealed that there are virtually no cases of multiple brands of antihistamines being prescribed simultaneously because they are considered substitutes Furthermore, the models are parsimonious This is important because we are interested in modeling interaction effects If we were to introduce all possible interactions between different marketing variables and for different brands, the dimensionality of the problem would make alternative models, such as linear sales models, extremely difficult to estimate with the available data

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[3] The study examines two other promotional variables (1) professional and medical journal advertising and (2) physician meetings and events

[4] The study also finds that the ROI for journal advertising is $5 00, the highest among all promotional variables

[5] Wittink (2002) also considers three therapeutic categories (hypertension, asthma, and arthritis) and examines the impact of promotions without distinguishing between brand-size and launch date The results for these categories are similar to those that he finds for the difference between the ROIs of detailing and DTC

In addition, we need to accommodate time-varying choice-sets Initially, there was only one drug in the category Claritin Subsequently, Zyrtec and Allegra were introduced The mixed-logit discrete choice specification that we use can easily account for such changes in the choice set Most alternative models cannot account for this without having regime-specific effects (e g , when there is one brand or two brands) in addition to all the other estimated parameters

The preceding are our various reasons for employing a hybrid model to explore the issues at hand We subsequently describe the category sales and conditional share models

Category Sales Model

Let Q_{jt} denote brand j's sales in month t, where j = 1, 2, , K + 1, the first K brands are the focal brands of interest, and the K + 1 brand is the "all-other" brand We determine category sales by aggregating the sales of all brands The relationships between brand sales, category sales (CQ_t), and share (S_{jt}) are given by the following

$$(1)\qquad CQ_t = \sum_{j=1}^{K+1} Q_{jt}, \text{ and}$$

$$(2)\qquad S_{jt} = Q_{jt} / \sum_{k=1}^{K+1} Q_{kt}$$

The category sales level depends on the prices, detailing, DTC, and OMEs of all brands in the category In addition, it depends on factors such as seasonality (SD_1 and SD_2)[6] To capture possible diffusion effects due to the introduction of new brands and category growth, we include linear and quadratic time trends (t and t^2) The category sales regression model is given as follows

$$(3)\qquad \ell n(CQ_t) = \rho_0 + \rho_1 CD_t + \rho_2 CA_t + \rho_3 CP_t + \rho_4 COME_t + \rho_5 CDP_t + \rho_6 CDA_t + \rho_7 CDOM_t + \rho_8 CAP_t + \rho_9 CAOM_t + \rho_{10} COMP_t + \kappa_1 SD_1 + \kappa_2 SD_2 + \tau_1 t + \tau_2 t^2 + e_t$$

The category stocks of goodwill associated with detailing, DTC, and OMEs (e g , meetings) are denoted by CD_t, CA_t, and $COME_t$, respectively The Verispan data we use in the empirical analysis reports a category price for each period, which is the share-weighted price of the individual brands We denote this price as CP_t The interaction terms between detailing and price, DTC, and OMEs are denoted by CDP_t, CDA_t, and $CDOM_t$, respectively Similarly, CAP_t and $CAOM_t$ represent interaction terms between DTC and price and OMEs, respectively, and $COMP_t$ represents the interaction term between OMEs and price Thus, we account for all possible paired interaction effects[7] Finally, in Equation 3, e_t is the random error term and $\rho_0 - \rho_{10}$, κ, τ_1, and τ_2 are parameters to be estimated[8]

We employ the standard Nerlove–Arrow (1962) exponential decay goodwill model (see also Lilien, Kotler, and Moorthy 1992, p 280) for each brand Let d_{jt}, a_{jt}, and ome_{jt} represent brand j's level of detailing, DTC, and OMEs, respectively, in period t Thus, the jth focal brand's goodwill stocks in period t (D_{jt}, A_{jt}, and OME_{jt}) are

$$(4)\qquad D_{jt} = \theta_D D_{j,t-1} + \sqrt{d_{jt}},$$

$$(5)\qquad A_{jt} = \theta_A A_{j,t-1} + \sqrt{a_{jt}},$$

and

$$(6)\qquad OME_{jt} = \theta_{ome} OME_{j,t-1} + \sqrt{ome_{jt}},$$

where θ_D, θ_A, and θ_{ome} are the carryover coefficients for detailing, DTC, and OMEs, respectively, and the square root captures diminishing effects (Erickson 1992) We constructed the category stock variables for detailing, DTC, and OMEs exactly as we did for category detailing, DTC, and OME variables, respectively Note that we could also have captured diminishing effects with quadratic terms or logarithms A quadratic specification would involve estimation of a large number of additional parameters, particularly because of the interaction terms A logarithmic specification is unable to deal with zeros in the variables However, the square root specification avoids such problems and is appropriate for our analysis

Conditional Share Model

We employ a mixed-logit formulation (see, e g , Chintagunta and Desiraju 2004, McFadden and Train 2000) to specify the focal brand j's share in period t, denoted by S_{jt}

$$(7)\qquad S_{jt} = \int_{z} [\exp(v_{jt} + \varepsilon_{jt}) / \exp(v_{(K+1)t} + \psi_1 t + \psi_2 t^2 + \lambda_1 SD_1 + \lambda_2 SD_2 + \varepsilon_{(k+1)t}) + \sum_{k=1}^{K} \exp(v_{kt} + \varepsilon_{kt})] f(\alpha) d\alpha,$$

and for the all-other brand, denoted by $S_{K+1,t}$

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[6] Note that we use SD_1 = 1 for March–June (the spring allergy season) and SD_2 = 1 for September–October (the fall allergy season)

[7] We do not explore higher-order interactions because the data are insufficient to obtain precise estimates for such effects

[8] Note that category prices, detailing, and DTC are likely to be endogenous (i e , correlated with the error term) We address this issue by using instruments for these variables

$$(8)\quad S_{K+1,t} = \int_{\mathbb{Z}} [\exp(v_{(K+1)t} + \psi_1 t + \psi_2 t^2 + \lambda_1 SD_1 + \lambda_2 SD_2 + \varepsilon_{(k+1)t}) / \exp(v_{(K+1)t} + \psi_1 t + \psi_2 t^2 + \lambda_1 SD_1 + \lambda_2 SD_2 + \varepsilon_{(k+1)t}) + \sum_{k=1}^{K} \exp(v_{kt} + \varepsilon_{kt})] f(\boldsymbol{\alpha}) d\boldsymbol{\alpha},$$

where

$$(9)\quad v_{jt} = \alpha_j + \gamma D_{jt} + \delta A_{jt} + \omega OME_{jt} + \beta P_{jt} + \mu_1 D_{jt} P_{jt} + \mu_2 D_{jt} A_{jt} + \mu_3 D_{jt} OME_{jt} + \mu_4 A_{jt} P_{jt} + \mu_5 A_{jt} OME_{jt} + \mu_6 OME_{jt} P_{jt},$$

where $\boldsymbol{\alpha} = \{\alpha_1 \quad \alpha_K\}$ is the vector of brand-specific intrinsic preference, and $\alpha_{(K+1)}$ is normalized to zero, β is the price sensitivity parameter, P_{jt} is the price of brand j in period t, D_{jt}, A_{jt}, and OME_{jt} are the stocks of goodwill defined in Equations 4–6, and γ, δ, and ω represent the corresponding sensitivities, respectively The parameters μ_1–μ_6 capture the sensitivities to the interaction terms We include both linear and nonlinear trend terms (t and t^2)[9] as a second-order approximation to a more general specification for diffusion of the new drugs in the market,[10] ψ_1 and ψ_2 are the associated coefficients The seasonal dummy variables are SD_1 and SD_2, and λ_1 and λ_2 are their associated coefficients

Our rationale for introducing the term ε_{jt} in Equation 7 is as follows There are several unobserved brand- and time-specific factors—potentially correlated with prices, detailing, and DTC—that could influence a brand's sales These include the influence of organizations such as health maintenance organizations and other factors such as the publication of medical studies and newspaper articles about newly discovered side effects All such factors are reflected in ε_{jt}, and we assume that it is a mean zero term

In Equation 7, we explicitly account for heterogeneity by assuming that the α_j parameters are draws from some unknown underlying distribution[11] We use $\boldsymbol{\alpha} = \{\alpha_j, j = 1, 2, \quad, K\}$ to denote the parameters of the share specification, $f(\boldsymbol{\alpha})$ to denote the joint density of the distribution of the parameters, and $\mathbb{Z}$ to denote the region of support of this mixing distribution that results in the choice of brand j

This mixed-logit formulation does not suffer from the restrictive elasticities that are typically associated with the standard logit model, which is the main reason we use this specification In addition to the mixed-logit model's allowing for more flexible substitution patterns, because it preserves the basic logit structure, it can be interpreted as the aggregation of choice probabilities of heterogeneous utility-maximizing agents[12] Note that we could have specified a mixing distribution on the other parameters as well (e g , price sensitivity, detailing sensitivity) However, because of data limitations, we restrict ourselves to specifying this distribution only for the brand intercepts

Overview of the Data

In this section, we discuss the data for the first category we study second-generation antihistamines A reason for our focus on antihistamines is the increasing use of DTC by leading firms in the category Furthermore, industry experts

TABLE 2
Number of Prescriptions and Market Shares: Antihistamines

Variable	Mean	Standard Deviation
Prescriptions (000)		
Allegra	922 88	510 42
Claritin	1364 97	652 32
Zyrtec	807 16	408 39
Total	5927 65	1913 32
Shares (%)		
Allegra	16 23	7 23
Claritin	36 43	14 16
Zyrtec	13 30	4 98
All other	44 12	28 94

TABLE 3
Prices, Detailing, DTC, and OMEs: Antihistamines

Variable	Mean	Standard Deviation
Prices		
Allegra	39 19	4 32
Claritin	48 32	4 98
Zyrtec	40 84	95
Detailing ($ in millions)		
Allegra	7 3342	2 9058
Claritin	6 8024	2 4725
Zyrtec	6 2402	2 0198
DTC ($ in millions)		
Allegra	5 2632	4 1873
Claritin	5 5307	6 4225
Zyrtec	4 5424	4 5543
Meetings ($ in millions)		
Allegra	1 2417	8213
Claritin	1 0337	1 0706
Zyrtec	1 1230	8789

Notes Prices and expenditure on detailing, DTC, and meetings are all expressed in constant January 1993 dollars

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[9] Note that t denotes the time, in months, since the introduction of the first of the three brands under consideration and captures the time trend in the share growth (decay) of the focal brands in the market compared with that of all-other brands If we change this to a variable specific to each drug based on the time of its introduction, only the estimates of the brand-specific intercepts are affected

[10] We also included higher-order terms, but they did not affect the results significantly

[11] The variation in the parameters could be due to various reasons, including cross-sectional heterogeneity, by which the preferences and sensitivities to marketing activities could vary

[12] For a more detailed discussion of how this mixed-logit approach allows for flexible substitution patterns, see, for example, Nevo (2000) and Berry, Levinsohn, and Pakes (1995)

FIGURE 1
New Prescriptions

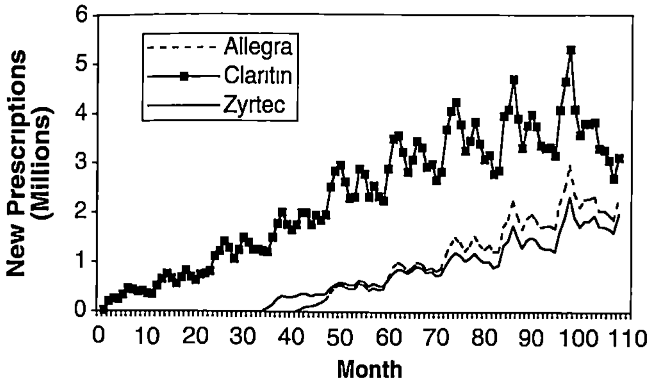


FIGURE 2
Detailing Expenditures

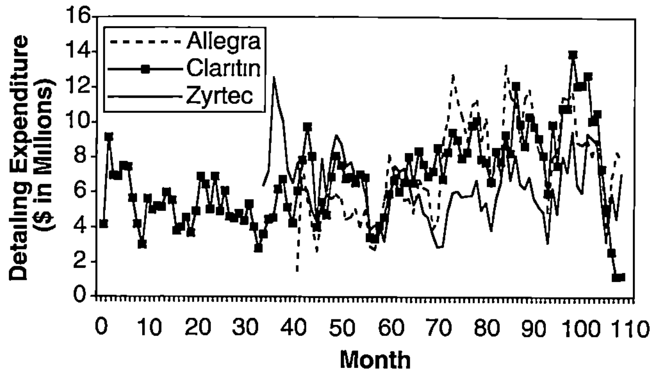


FIGURE 3
DTC Expenditures

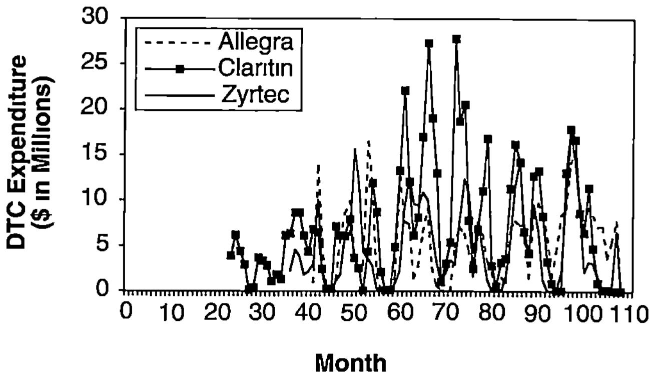
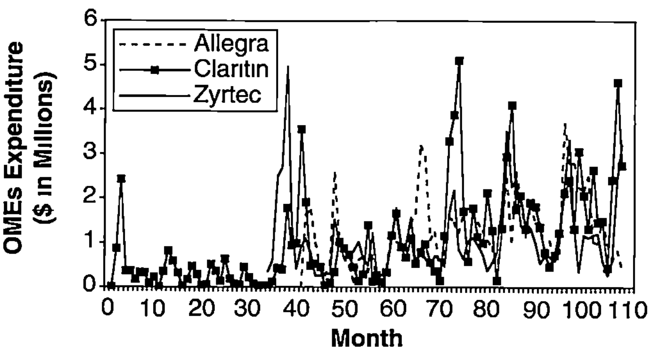


FIGURE 4
OMEs Expenditures



indicate that in categories in which generics have been introduced, firms tend to reduce (if not discontinue) detailing activities. Therefore, to better understand the impact of detailing, it is critical to select a category in which generics have not yet accrued significant market shares. For these reasons, we focus on the marketing-mix decisions of three branded antihistamines: Claritin, Zyrtec, and Allegra.

Our data, obtained from Verispan, comprise observations on three brands of second-generation antihistamines and the fourth all-other brand, which is the aggregation across all other antihistamines (first-generation antihistamines and prescribed over-the-counter medications). The second-generation antihistamines perform much like the first-generation drugs (e.g., Chlor-Trimeton, Benadryl) but improve "quality of life" considerably as a result of improved side-effects profiles (e.g., less drowsiness).

The observations in the data are for the entire U.S. market, on a monthly basis, from April 1993 through March 2002. For each brand, the data set tracks the total prescriptions written, the average retail price of the prescription, detailing expenditures, DTC expenditures, and OME expenditures. Descriptive statistics for the data appear in Tables 2 and 3, and Figures 1–4 depict the time series of sales, detailing expenditures, DTC expenditures, and OME expenditures, respectively. Note that the timing of introduction of the three brands is as follows: Claritin in April 1993, Zyrtec in January 1996, and Allegra in August 1996.

Estimation Issues

Methodology

The category demand function in Equation 3 is a simple linear regression. We used the methods laid out in the work of Berry (1994) and Nevo (2000) to obtain estimates for the parameters of the brand-share function in Equation 7. We deflated prices using the consumer price index for all urban consumers. We deflated detailing expenditures using the wage series for all workers. We obtained the consumer price index and wage series from the Bureau of Labor Statistics (BLS).

Our price variable is the average retail price per prescription. We believe that this is a reasonable measure because, according to industry experts, physicians or patients often use price per prescription to compare medications.

Instruments

Our analysis assumes that firms' prices, detailing, and DTC activities are endogenous in the category sales and brand-share models Thus, we needed to instrument for these variables in the estimation because they could be correlated with the error terms We used three sets of instruments in the estimation The first set has variables that could potentially drive the costs of producing the drugs and includes the producer price index (PPI) for pharmaceuticals, obtained from BLS This series captures the prices for bulk drugs and therefore a component of the costs faced by the marketers of brand name antihistamines In the estimation, we allowed the instruments to influence prices of the various brands differentially by interacting them with the brand intercepts in the estimation Furthermore, we used lagged values (up to 12 periods) of the PPIs interacted with the brand intercepts as additional instruments Thus, we constructed 36 ($12 \times 3 = 36$) instruments from the PPIs

For detailing instruments, we compiled the data for the number of employees from the annual reports of the firms in our data set Although firms report financial numbers to the Securities and Exchange Commission every quarter, they report the number of employees only annually We assumed that the number of employees in any month was the same as for the year Thus, we developed one instrument from the employee data[13] Finally, we used the PPIs for television, radio, and print advertising (which we obtained from BLS) as instruments for DTC We also included interactions of the instruments for price, detailing, and DTC to construct the overall instrument matrix[14]

The Heterogeneity Distribution

We assumed that the set of parameters, $\boldsymbol{\alpha} = \{\alpha_j, j = 1, 2, \ldots, K\}$, is heterogeneous, and we specified a normal distribution to represent this heterogeneity Because we assumed that brand preferences are not correlated, we had three mean parameters and three variance parameters to estimate We could have allowed for a richer structure of heterogeneity, including the sensitivities to marketing activities and the interaction terms and correlations between different parameters, however, data limitations did not enable us to estimate the large number of parameters that such a specification would entail

Carryover Parameters

The carryover parameters (θ_D, θ_A, and θ_{ome}) could not be estimated and needed to be fixed Our preliminary analysis with simple models that allow for the estimation of these parameters revealed that carryover parameters were 86%, 75%, and 92% for detailing, DTC, and OMEs, respectively For our estimation, we fixed the carryover rates at these values[15] The rates seem to be consistent with other findings in the literature For example, Roberts and Samuelson (1988, Table 2) report advertising retention rates of greater than 80% in the cigarette industry, and Berndt and colleagues (1997) report a carryover rate of 85% for advertising in the antiulcer pharmaceutical market[16]

Standard Errors

We computed the heteroskedasticity and autocorrelation consistent standard errors using Newey and West's (1987) estimator

Results and Discussion

This section is divided into several subsections that are organized as follows We begin by discussing the parameters of the demand function We then discuss the single- and multiperiod ROI measures for DTC and detailing We next discuss the impact of marketing-mix interactions on ROI and consider the impact of the interactions on price elasticity Finally, we present the results from the antiviral category

Parameters of the Demand Function

In Table 4, we provide the parameter estimates and the standard errors from the category sales regression model in Equation 3 Note that in this model, we explicitly account for the endogeneity in price, detailing, and DTC stock variables by using PPIs for pharmaceuticals as instruments for prices, employees in all the three firms in the category as instruments for detailing, and PPIs for radio, television, and print advertising as instruments for DTC We find that after controlling for the two seasonal effects and the diffusion effects through the time trend, only DTC has a statistically significant effect This finding is consistent with previous

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[13] Note that the firms in the data set are Schering-Plough (maker of Claritin), Aventis (maker of Allegra), which was formed by the merger of Rhone-Poulenc and Hoechst (thus, for earlier periods, we used the sum of employees for the two firms), and Pfizer (maker of Zyrtec), for which we added Warner-Lambert's figures before it merged with Pfizer

[14] We also conducted two additional sets of analysis First, we conducted a robustness check using another set of instruments that contained promotional expenditures in the nasal steroid category There are common underlying factors that drive promotional spending in both categories In addition, regulatory factors, seasonality, and other institutional factors are similar between the two categories Thus, the nasal steroid promotional activities are likely to be correlated with those in the antihistamine category but uncorrelated with the error term Second, we also compared predictions for a holdout sample with the sets of instruments The overall results are consistent, all these analyses are available on request from the authors

[15] We found the parameters using a grid search for a simple aggregate logit model with an outside good to represent category growth The aggregate logit model reduces to a linear regression, and we chose the parameters with the highest R^2 Such a grid-search method is a fairly standard way of estimating the carryover parameters For example, Wittink (2002) uses a grid search to find the carryover parameter, similarly, Guadagni and Little (1983) use a grid search to find the carryover for the loyalty smoothing parameter Berndt and colleagues (1997) also use a grid-search methodology similar to ours, in which we estimate the model for various values of carryover and choose the set of parameters for which the sum of squared residuals is the lowest Note that if we conducted this grid search for our full model, each iteration of the mixed-logit model would take several hours

[16] For further evidence on retention rates (including on monthly data), see Clarke's (1976) survey of results from more than 70 studies that use the distributed lag structure

TABLE 4
Parameter Estimates of the Category Sales Model: Antihistamines

Parameters	Estimate	Standard Error
Intercept	8 9681**	7245
Price	– 0063	0131
Detailing stock	– 0093	0560
DTC stock	0152*	0084
OMEs stock	0145	0173
Detailing × price	0210	0307
Detailing × DTC	0156	0194
Detailing × OMEs	– 0035	0055
DTC × price	– 0033	0024
DTC × OMEs	0006	0005
OMEs × price	– 0004	0004
Time	– 0097	0063
Time^2	4 6976e-05	0001
Spring season (SD$_1$)	1452**	0309
Autumn season (SD$_2$)	0859**	0267

*Significant at the 90% level
**Significant at the 95% level

research (Wosinska 2002) Table 4 also indicates that none of the marketing-mix interactions are statistically significant We find that the two seasonal dummy variables have significant effects, which reflects the strong seasonality in the category as a whole

We report the estimates for the parameters of the conditional share model, from Equation 7, in Table 5 [17] We find that Claritin is the most preferred brand, followed by Zyrtec and Allegra, in that order The parameter estimates for the main effects of price, detailing, and DTC are statistically significant and have the expected signs Detailing and price are significant at the 95% level, and DTC is significant at the 90% level However, the parameter for the direct effect of OMEs is insignificant These results, together with the ones for the category sales model (Table 4), reveal a notable contrast Although detailing has a significant effect on brand switching but not category sales, DTC has significant effects both on category sales and on brand switching

It is worthwhile to compare these findings with ones from previous empirical research Rosenthal and colleagues (2002) find that detailing and DTC affect only category sales (not brand share), furthermore, DTC has a greater impact than detailing on category sales Wosinska (2002) finds that both DTC and detailing affect brand share, but the impact of detailing is greater than that of DTC As does Wosinska (2002), we find that detailing has a greater effect on brand switching than DTC

We find that there are four interaction effects that are significant at the 95% level the interactions between (1) detailing and price, (2) detailing and DTC, (3) detailing and OMEs, and (4) DTC and OMEs In addition, the interaction between OMEs and price is significant at the 90% level The interactions between detailing and price, between detailing and OMEs, and between DTC and OMEs are all negative The interactions between OMEs and price and between detailing and DTC are positive

The positive interaction between detailing and DTC implies that there is synergy between the two marketing activities In other words, a physician sales call (which usually emphasizes the therapeutic benefits of a brand) has a greater impact when combined with the brand's television or print advertisement (which induces consumers to ask their physician about it) In the context of pharmaceutical promotional expenditures, to our knowledge, this is the first time that such a positive synergy has been documented

In contrast, the finding of significant, negative interactions between OMEs on the one hand and DTC or detailing on the other hand points to the lack of synergy between these pairs of activities Coupled with the finding of no significant main effect for OMEs, it appears that OMEs' influence on the demand for the three antihistamines is limited

The set of interactions between price and detailing and between price and OMEs is also notable As we noted previously, the detailing × price interaction is negative and significant Because the main effect of price is negative, a negative interaction implies that greater detailing increases price sensitivity In turn, this implies that more detailing reduces the prices that firms can charge for their drugs The OMEs × price interaction is significant at the 90% level but, in contrast to the detailing × price interaction, is positive This implies that greater amounts of OMEs reduce price sensitivity and therefore enable firms to charge a higher price for their drugs The interaction between price and DTC is not statistically significant

Next, to understand the joint impact of main and interaction effects of the promotional expenditures, we compute the short-term promotional elasticities For example, by "short-term detailing elasticity," we refer to the percentage change in current-period sales (prescriptions written, in our case) for every percentage change in detailing investments These elasticities enable us to compare the estimated magnitudes of the coefficients of detailing and DTC investments for the three brands We compute the elasticities by simulating the new sales of each brand by varying the respective promotional variable by 1% In principle, when a variable changes for a particular brand, it also changes for the category as a whole Therefore, the elasticities incorporate the effects through the brand-share model and the category model Detailing share and DTC elasticities are reported in Table 6

Inspection of the elasticities reveals that, overall, detailing has a much greater impact on shares than does DTC [18] Furthermore, Allegra's detailing has the greatest negative effect on the shares of the other two brands, and Zyrtec's

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[17] Note that we instrumented for all endogenous variables in this estimation, and the "base brand" is the all-other brand that has been included in the analysis

[18] These results appear to be largely consistent with those reported by Wosinska (2002), who used individual-level data They are also consistent with Wittink's (2002) analysis of large brands (i e , with revenues of more than $500 million) introduced in 1998–2000 (see "Literature Review" herein) However, Wittink does not present explicit elasticity estimates

TABLE 5
Estimates for the Mean Coefficients: Share Model (Antihistamines)

Parameter	Mean Parameters Estimate	Mean Parameters Standard Error	Heterogeneity Parameters Estimate	Heterogeneity Parameters Standard Error
Intercept Allegra	–4 0348**	3840	1996**	0065
Intercept Claritin	–1 9550**	3885	8174**	0034
Intercept Zyrtec	–3 9195**	3922	2271**	0056
Price	– 0977**	0215		
Detailing stock	2853**	0295		
DTC stock	1946*	1117		
OMEs stock	0521	0652		
Detailing × price	– 0061**	0010		
Detailing × DTC	0185**	0051		
Detailing × OMEs	– 0114**	0056		
DTC × price	4 4855e-05	0034		
DTC × OMEs	– 0373**	0097		
OMEs × price	0054*	0032		
Time	0960**	0079		
Time²	– 0004**	4 4730e-05		
Spring season (SD_1)	1007**	0492		
Autumn season (SD_2)	1086*	0605		

*Significant at the 90% level
**Significant at the 95% level

detailing investments have the least effect Although the DTC own-elasticity for Claritin is the lowest of the three brands, its DTC cross-elasticities are higher than those of the other brands Thus, although the own-effect of Claritin's DTC is low, it is still able to affect the other brands' shares more than they affect its share

This pattern of elasticities implies that the nature of competition across brands is highly asymmetrical For example, the first entrant (Claritin) is able to affect sales of the other brands negatively through DTC investments, but it is not as susceptible to the other brands' DTC investments In the case of detailing investments, Allegra has the greatest effect on the sales of the other brands, and the effect of Claritin is smaller but comparable Coupled with the higher intrinsic preference for Claritin (Table 5), its high cross-elasticities imply that the brand is in a strong position in the antihistamine marketplace Allegra's detailing has a large impact on other brands, but its DTC has a relatively small impact In contrast, the effect of Zyrtec's detailing and DTC investments on the sales of the other brands is relatively small Nevertheless, that Zyrtec can influence its sales through promotional investments is good news for the brand, the high own-elasticities suggest that it is able to influence its own sales by stealing share from the all-other group that we included in the analysis

ROI Measures

We now turn to short-term or single-period ROI, which is the revenue impact of the marginal dollar spent on a particular promotional activity

$$\text{ROI}^g_{jt} = p_{jt}\frac{\partial Q_{jt}}{\partial g_{jt}} = p_{jt}\left[CQ_t\frac{\partial S_{jt}}{\partial G_{jt}}\frac{\partial G_{jt}}{\partial g_{jt}} + S_{jt}\frac{\partial CQ_t}{\partial G_{jt}}\frac{\partial G_{jt}}{\partial g_{jt}}\right], \tag{10}$$

where g is the promotional activity and G is the goodwill stock associated with the promotional activity (i e , d and D denote detailing, and a and A denote DTC), p is the price, Q

TABLE 6
Current-Period Detailing and DTC Elasticities: Antihistamines

Change in Number of Prescriptions	Allegra	Claritin	Zyrtec
	Change in Detailing		
Allegra	1772	– 0423	– 0311
Claritin	– 0455	0950	– 0369
Zyrtec	– 0481	– 0436	1440
	Change in DTC		
Allegra	0909	– 0352	– 0138
Claritin	– 0151	0543	– 0107
Zyrtec	– 0205	– 0377	0717

is the sales, CQ is the category sales, and S is the share of the respective brand We also computed the ROIs by simulation, we varied the respective promotional activity by one dollar and simulated the new sales Table 7 presents the current- and multiperiod ROIs[19] Note that these ROIs are in terms of revenues that correspond to retail prices Thus, actual revenues for the manufacturing firm would be lower because the revenues would be net of retail and wholesale margins This must be kept in mind during discussions of the ROI numbers

Table 7 reveals that average current-period detailing ROIs are $1 28 for Allegra, $1 49 for Claritin, and $1 10 for Zyrtec Thus, the marginal $1 spent on detailing returns more than $1 in revenue This finding supports an increase in the level of detailing, except if it induces competitive reaction that raises rival detailing expenditures and makes the increased spending not pay out We find that the ROIs for DTC are lower than the ROIs for detailing and less than $1 Specifically, the average current-period ROIs are $ 85 for Allegra, $ 66 for Claritin, and $ 76 for Zyrtec That ROIs are less than $1 suggests that firms would be better off reducing their expenditure on this marketing activity However, as we discuss in the next paragraph, to obtain a more complete picture of investment returns, both single- and multiperiod ROIs should be assessed

Current-period ROIs ignore that effects of marketing investments last more than one period Indeed, in our specification, there is carryover of 86%, 75%, and 92% for detailing, DTC, and OMEs, respectively When a firm raises its promotional expenditure by one dollar, that one dollar affects goodwill not only for the current period but also for future periods When this intertemporal linkage is taken into account, a multiperiod ROI needs to be reported

We used the following procedure to compute a multiperiod ROI For a given set of values of all the independent variables, we computed the expected value of the dependent variables (shares, category sales, and consequent revenues) Then, we raised a given promotional expenditure for a single focal period by one dollar and computed the new revenues in the current and subsequent periods (under the assumption that competitors do not react to such an increase in expenditure) We repeat this experiment for all periods (except the last 11 periods) and report the multiperiod ROI as the average change in the sum of revenues for the current and 11 subsequent periods for every additional one dollar spent on that promotional activity in the current period That is, multiperiod ROI represents the change in revenues for a year from the period in which the promotional activity changes These ROIs are also reported in Table 7 for both detailing and DTC We note that long-term ROIs for detailing and DTC are much higher than for single-period ROIs (Table 7) Thus, detailing continues to have a greater effect than DTC, even over a longer horizon

It is worth comparing our findings with those in previous studies that report ROIs for detailing and DTC Neslin (2001) reports (multiperiod) ROIs of $1 72 for detailing and $ 19 for DTC These are considerably lower than the ROIs in our study However, when we compare our ROIs with those reported for large categories (i e , categories with median brands that have revenues of more than $200 million per year, under this definition, antihistamines are a large category), our results are more comparable Neslin reports the detailing ROI for large categories launched in the 1994–1996 period to be $6 76, for large categories launched after 1996, the detailing ROI was $10 29 These are comparable to the ROIs in our study (between $7 65 and $9 19) However, we find that ROIs for DTC are much higher than even those that Neslin reports for large categories $1 37 for large categories launched after 1996 This could reflect the antihistamine category's status as a poster child for DTC

Similar conclusions can be drawn from a comparison of our results with those of Wittink (2002) Our detailing ROIs are consistent with those in Wittink's study (for the large brands introduced in 1998–2000), but the ROIs for DTC are much larger in our case[20] This contrast underscores the importance of examining different submarkets of the industry and parsimoniously accounting for category-expansion, share-stealing, and carryover effects to grasp the revenue impact of promotional investments fully

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[19] We discuss how we computed the multiperiod ROIs later in this section

[20] In addition, our long-term ROIs are higher than those reported in the work of Wittink (2002) for the smaller brands (i e , less than $500 million in annual revenues) and for the larger brands that were launched before 1998

TABLE 7
ROI Measures: Antihistamines

Every Marginal $1 Spent	Additional Revenue ($)		
	Allegra	Claritin	Zyrtec
Detailing			
Current period	1 2814	1 4923	1 1049
Multiperiod	8 8778	9 1920	7 6583
DTC			
Current period	8498	6597	7567
Multiperiod	3 8073	3 6964	2 7861

Notes Multiperiod indicates current period + 11 subsequent periods

It is useful to note three other studies that examine ROIs for advertising in nonpharmaceutical categories Lambin (1970) studies a mature category of consumer durables in Europe and finds that ROI for advertising is $1 25 (i e , the incremental $1 causes revenues to increase by $1 25) Horsky (1977) finds that the total incremental gross margins over the course of a year due to an incremental $1 spent on advertising are $1 77 without discounting, $1 60 with discounting, and $1 04 for the current period Peles (1971) reports a current-period incremental gross margin of $ 77 and a long-term incremental gross margin of $1 70 for every incremental $1 spent on advertising Our results are similar to the ones in these studies in that an additional $1 spent on advertising raises revenues by more than $1

Impact of Marketing-Mix Interactions on ROI

Because our focus is interaction effects, we assess the impact of all the significant interaction effects on ROIs for detailing and DTC All interaction effects except that between price and DTC are significant at least at the 90% level We assessed the impact of these interactions on ROIs by determining the effects of changes in price, OMEs, and DTC on detailing ROIs and those of detailing and OMEs on ROIs for DTC For example, to study the impact of the interaction effect between detailing and price, we varied price by 5% to determine the effect that change has, for example, on detailing ROIs We implemented the price variation by simulating the category sales and brand shares using the category and share models at 95% and 105%, respectively, of the actual price levels Similarly, we analyzed the effect of DTC on detailing ROIs and price and detailing on ROIs for DTC We report these results in Tables 8 and 9

An examination of these results reveals that compared with the other variables, price has a much greater impact on detailing ROIs A 5% increase in price decreases detailing ROIs by 16% to 21% for the three brands Conversely, a 5% decrease in price increases detailing ROIs by 15% to 23%

Detailing and DTC both have a positive effect on each other's ROI, that is, increased DTC causes detailing ROI to increase, and vice versa Detailing ROI increases by 3% to 4% with a 5% increase in DTC, and it decreases by a similar amount when DTC decreases by 5% The decrease in ROI for DTC is between 6% and 16% for a 5% decrease in detailing, and the ROI for DTC increases by 9% to 12% with a 5% increase in detailing

A notable result is that detailing has a greater effect on ROIs for DTC than vice versa This is because the interaction effect between detailing and DTC constitutes a greater component of the total DTC effect than of the total detailing effect (because the main effect of DTC is much less than the main effect of detailing) Thus, the interaction effect plays a bigger role for ROIs for DTC

In addition, OMEs have a relatively small effect on detailing ROIs but a much greater effect on ROIs for DTC A 5% increase in OMEs causes detailing ROIs to decrease by 3% to 5% There is a similar percentage increase in detailing ROIs if OMEs decrease by 5% However, ROIs for

TABLE 8
Effect of Price, DTC, and OMEs on Detailing ROI: Antihistamines

	Multiperiod Detailing ROI		
Levels	**Allegra**	**Claritin**	**Zyrtec**
Price			
Actual – 5%	10 7303	10 5548	9 4172
(% +/– w r t actual level)	(+20 86%)	(+14 83%)	(+22 97%)
Actual level	8 8778	9 1920	7 6583
Actual + 5%	7 0399	7 6658	6 0492
(% +/– w r t actual level)	(–20 70%)	(–16 60%)	(–21 01%)
DTC			
Actual – 5%	8 5476	8 8763	7 4055
(% +/– w r t actual level)	(–3 72%)	(–3 43%)	(–3 30%)
Actual level	8 8778	9 1920	7 6583
Actual + 5%	9 2027	9 5736	7 9082
(% +/– w r t actual level)	(3 66%)	(4 15%)	(3 26%)
OMEs			
Actual – 5%	9 3413	9 5761	7 9043
(% +/– w r t actual level)	(5 22%)	(4 18%)	(3 21%)
Actual level	8 8778	9 1920	7 6583
Actual + 5%	8 4306	8 9148	7 3882
(% +/– w r t actual level)	(–5 04%)	(–3 02%)	(–3 53%)

Notes w r t = with respect to, multiperiod indicates current period + 11 subsequent periods

TABLE 9
Effect of Detailing and OMEs on DTC ROI: Antihistamines

Levels	Multiperiod DTC ROI Allegra	 Claritin	 Zyrtec
Detailing			
Actual – 5%	3 5622	3 1028	2 4063
(% +/– w r t actual level)	(–6 44%)	(–16 06%)	(–13 63%)
Actual level	3 8073	3 6964	2 7861
Actual + 5%	4 3066	4 1635	3 0309
(% +/– w r t actual level)	(+13 11%)	(+12 64%)	(+8 79%)
OMEs			
Actual – 5%	4 6725	4 3177	3 1277
(% +/– w r t actual level)	(22 72%)	(16 81%)	(12 26%)
Actual level	3 8073	3 6964	2 7861
Actual + 5%	3 2809	2 6784	2 1916
(% +/– w r t actual level)	(–13 83%)	(–27 54%)	(–21 34%)

Notes w r t = with respect to, multiperiod indicates current period + 11 subsequent periods

DTC decrease by 14% to 28% when OMEs increase by 5% When OMEs decrease by 5%, ROIs for DTC increase by 12% to 23% The different magnitudes of effects on ROIs for detailing and DTC reflect that the interaction effect is a much greater proportion of ROIs for DTC than for detailing

In summary, note that price has a large, negative effect on detailing ROI, larger than effects due to OMEs Next, detailing has a greater effect on ROIs for DTC than vice versa Here, we have documented not only the synergy between detailing and DTC but also the asymmetrical effects on firms' revenues In addition, OMEs have a greater (negative) impact on ROIs for DTC than for detailing

It is worthwhile to note that an interaction effect exists between DTC and detailing on brand sales simply because DTC has a significant effect on category volume and because detailing has a significant effect on brand shares Thus, even in the absence of any explicit interaction effect in the brand-share model, we would still observe an implicit interaction effect Higher DTC would increase category volumes, thus, detailing ROI would be affected even if the explicit interaction were to be shut off To investigate this, we conducted a simulation in which we set the explicit interaction terms in the category and brand-share models to zero and computed the change in detailing ROIs for a 5% change in DTC The results are reported in Table 10 Note that because there is no explicit interaction in the share model for this simulation, the absolute levels of these ROIs are different from those reported in Table 7 In particular, note the percentage changes in ROIs with 5% change in DTC We find that a 5% increase in DTC causes detailing ROIs to increase by approximately 7% to 1 2% A 5% decrease in DTC causes detailing ROI to increase by 1% to 3 5% This is a notable result because it demonstrates a unique synergistic effect in pharmaceutical categories DTC drives category volume by leading patients to talk to their physicians, and detailing then steals share by inducing physicians to prescribe the focal drug

Impact of Marketing-Mix Interactions on Price Elasticities

We have discussed the implications of the interaction effect between price and the marketing variables on ROIs How-

TABLE 10
Effect of DTC on Detailing ROIs: Antihistamines

DTC Level	Own-Price Elasticity Allegra	 Claritin	 Zyrtec
Actual – 5%	3 6943	1 2142	4 3062
(% +/– w r t actual level)	(–1 00%)	(–3 53%)	(–1 23%)
Actual level	3 7318	1 2586	4 3600
Actual + 5%	3 7679	1 2672	4 4126
(% +/– w r t actual level)	(97%)	(68%)	(1 21%)

Notes Effects pertain to category sales only, that is, the interaction effect in the share model is turned off w r t = with respect to ever, the two significant interaction effects between price on the one hand and detailing or OME on the other hand also have implications for price elasticities. We begin this discussion by recalling the debate in the literature on advertising's effect on price elasticities (see Kaul and Wittink [1996], who report empirical evidence for both positive and negative effects of advertising on price elasticities). We explore these interactions using an approach similar to the one used for analyzing the interaction effects on ROIs. We vary detailing and OMEs for the focal brand by 5% and record the change in the price elasticities. These results are reported in Table 11.

We find that greater detailing increases price elasticities. A 5% increase in detailing increases price elasticities by 1.5% to 2%. A 5% decrease in detailing similarly decreases price elasticities by approximately 1.5% to 2%. The interaction effect between OMEs and price has the opposite sign of that between detailing and price. Thus, an increase in OMEs causes price elasticity to decrease. For example, if OMEs increase by 5%, price elasticities decrease by approximately 1.5% to 2.5%. There is a similar increase of 1.5% to 2.5% in price elasticities when OMEs decrease by 5%. These results can have important implications for firms' pricing policies (see, e.g., "Managerial Implications" herein).

Results from the Antivirals Category

The results we have reported are for the antihistamine category. Although there are likely to be differences between categories in returns on promotional activities, it would be useful to determine whether our key results on ROI are specific to the category under study or whether the results can be applied more generally. Of specific concern is that the antihistamine category has an extremely high level of DTC among all therapeutic categories. Therefore, we conducted an identical analysis for the antivirals category in which DTC expenditures are nonzero but still are much smaller than those in the antihistamine category.

Although genital herpes is an incurable disease, it can be controlled and its symptoms mitigated through the use of specific antiviral drugs. The first drug to be introduced in this category was Glaxo Wellcome's Zovirax (generic acyclovir), which is available both in tablet and topical (cream) forms (Glaxo Wellcome subsequently merged with SmithKline Beecham to form GlaxoSmithKline). SmithKline Beecham launched Famvir (generic famciclovir) in July 1994 but sold it to Novartis in 2000 when Smithkline merged with Glaxo (to meet Federal Trade Commission requirements). The merged entity GlaxoSmithKline launched another drug in the category, Valtrex (generic valacyclovir), in September 1995. In April 1997, Zovirax went off patent, and generic substitutes became available.

The highest-share brand in the category is currently Valtrex. Before its introduction, Zovirax was the market leader. Valtrex is the only brand that had significant DTC levels, whereas Famvir and Zovirax had almost none. The expenditure on detailing was relatively steady, and all brands have invested in detailing.

Our data set for the category consists of a monthly time series that extends over 11 years of sales, prices, and promotional expenditures for all brands in the category. We set Zovirax topical as the base brand for the brand-share model because, unlike the antihistamine category, there is no all-other brand in the antiviral case.

We report the detailing elasticities for the antiviral category in Table 12. (Valtex is the only brand in the category that invested in DTC activity, and its current-period DTC elasticity is .1777.) All the elasticities have the expected signs, and their magnitudes are comparable to those for the antihistamine category. Furthermore, we report the ROIs for detailing and DTC in Table 13. The current-period detailing ROI is greater than one for all three brands in the category,

TABLE 11
Effect of Detailing and OMEs on Price Elasticity: Antihistamines

	Own-Price Elasticity		
Level	**Allegra**	**Claritin**	**Zyrtec**
Detailing			
Actual – 5%	–3.0081	–2.3308	–2.9330
(% +/– w.r.t. actual level)	(–1.58%)	(–1.76%)	(–2.11%)
Actual level	–3.0563	–2.3726	–2.9964
Actual + 5%	–3.1006	–2.4117	–3.0565
(% +/– w.r.t. actual level)	(1.45%)	(1.65%)	(2.01%)
OMEs			
Actual – 5%	–3.1045	–2.4117	–3.0695
(% +/– w.r.t. actual level)	(1.58%)	(1.65%)	(2.44%)
Actual level	–3.0563	–2.3726	–2.9964
Actual + 5%	–3.0078	–2.3342	–2.9249
(% +/– w.r.t. actual level)	(–1.59%)	(–1.62%)	(–2.38%)

Notes: w.r.t. = with respect to.

TABLE 12
Current-Period Elasticities: Antivirals

Change in Number of Prescriptions	Change in Detailing Famvir	 Valtrex	 Zovirax
Famvir	5216	− 1086	− 0371
Valtrex	− 0885	2980	− 0123
Zovirax	− 1666	− 1092	0735

TABLE 13
ROI Measures: Antivirals

For Every Marginal $1 Spent	Additional Revenue ($) Famvir	 Valtrex	 Zovirax
Detailing			
Current period	2 6786	1 6421	3 7380
Multiperiod	11 7172	8 1088	17 6368
DTC			
Current period		6852	
Multiperiod		2 8578	

Notes Multiperiod indicates current period + 10 subsequent periods

which suggests that the marginal dollar spent on detailing returns more than one dollar in marginal revenues for all three brands in the category The ROI for DTC is only reported for Valtrex, because it is the only brand in the category that invested in DTC For Valtrex, the ROI for DTC is less than one, which suggests that the marginal dollar spent on DTC for the brand returns less than one dollar in marginal revenue in the current period Although the magnitudes of the ROIs vary from those for antihistamines, the nature of results we obtained is nevertheless similar to the nature of results in the antihistamine category

The multiperiod ROIs for detailing and DTC are also reported in Table 12 The nature of these multiperiod ROIs for detailing and for DTC is similar to that for antihistamines Specifically, we find that the detailing and DTC ROIs are both greater than one in the long run Although we were unable to conduct an analysis of the full set of interactions between pairs of marketing-mix elements, as we did in the antihistamine category, the interaction effects are consistent with those for that category For example, detailing has a similar effect on price elasticity as it does in the case of antihistamines A 5% reduction in detailing causes price elasticities to decrease by 1 34% for Famvir, 91% for Valtrex, and 2 07% for Zovirax A 5% increase in detailing similarly causes price elasticities to increase by 1 31%, 9%, and 2 01%, respectively Thus, greater detailing leads to higher elasticities and thus lower prices

Managerial Implications

This article's purpose has been to explore the interactions between pairs of marketing-mix elements and how the interactions affect ROI Accordingly, our econometric analysis identified several statistically significant interactions and estimated the impact of the interactions on ROI Although we have reported and discussed our results, here we reiterate the four results that we deem the central takeaways of the analysis

First, our analysis finds that the interaction between price and detailing is negative Because a higher price adversely affects demand, the negative interaction implies that at higher levels of detailing, the demand is even more sensitive to higher prices A manager who employs higher detailing levels faces a downward pressure on prices We believe that this finding counters the often-repeated tenet, "marketing tends to raise prices by (artificially) differentiating the products" Contrary to such expectations, detailing efforts seem to reduce differentiation However, it must be noted that there are many other factors that drive managers' pricing decisions, such as firms' objectives for recovering research and development costs, health maintenance organizations' formulary decisions, and other intermediaries' policies Thus, pricing policy may not always reflect the interaction effect that we have identified

Second, a brand's expenditures on detailing and DTC can affect sales in two ways by affecting product category sales and by affecting the brand's share of category sales Our analysis reveals that whereas DTC has a significant effect on category sales, detailing does not In contrast, both detailing and DTC affect brand shares, and we find that detailing has a much greater effect than DTC The implication is that when managers want to drive up category volume, perhaps in the early stages of a product's life cycle, they should consider allocating a substantial portion of the marketing budget to DTC In contrast, in the more mature phases of the drug life cycle (but before the entry of generics), it seems beneficial for them to use a mix of detailing and DTC, with a greater emphasis on detailing

Third, when making resource allocation decisions, it is important for managers to consider synergies among the various marketing investments In this context, two of our findings are particularly relevant (1) the positive interaction between DTC and detailing and (2) the negative interaction between OMEs and either DTC or detailing Industry observers often question the value of pharmaceutical manufacturers' increased DTC spending, particularly when studies such as those of Neslin (2001) and Wittink (2002) show relatively poor returns on DTC However, the positive interaction that we identified implies that higher levels of DTC may indeed make detailing more effective These two expenditures work hand-in-hand, and managers can generate an effect that is greater than the sum of its parts by using these marketing-mix elements simultaneously Next, the negative interaction between OMEs and detailing (or DTC) implies that managers approach OME resource allocation more carefully It appears that OME spending jams the value of the other marketing-mix elements In this case, managers are well advised to limit the overlap between OMEs and either DTC or detailing, perhaps by targeting different segments (or groups) of physicians with OMEs or by separating OMEs and DTC (or detailing) temporally

Fourth, our analysis developed both short- and long-term ROI benchmarks for specific subcategories of pharmaceuticals Recall that unlike our study, which focuses on one category of pharmaceuticals at a time, both Neslin (2001) and Wittink (2002) approach ROI estimates by aggregating various (categories of) drugs However, the commonality among the studies (including ours) is that the ROI for DTC is less than that for detailing, although the exact numerical values vary from study to study, the pattern seems to be fairly robust We also provide explicit long-term ROI estimates and find that long-term ROIs are approximately four to seven times single-period ROIs We note that an increase in detailing has a greater impact on ROIs for DTC than vice versa Finally, although there are individual differences between the antihistamine and antiviral categories, our results for both categories suggest that detailing ROIs are higher than DTC ROIs

The main implication is that whereas the ROI estimates developed for a given product-market may or may not apply to other categories, it is relevant for managers to identify and understand the underlying drivers of ROI In this article, we endeavored to highlight the role of interactions in some detail Research that explores other drivers of financial performance of marketing variables is certainly warranted

Conclusion

We opened this article with the objective of addressing two issues (1) the empirical characterization of the interactions between pairs of marketing-mix elements and (2) the development of benchmarks for the impact of promotional expenditures (with a particular focus on detailing and DTC expenditures) on both short- and long-term ROIs

Using monthly observations from April 1993 to March 2002, we examined market shares, prices, and promotional expenditures of three brands (Claritin, Zyrtec, and Allegra) in a subcategory of pharmaceuticals We focused on this particular category because of the high expenditures on DTC and because generic products have not yet appeared in the market for second-generation antihistamines To provide a robustness check, we repeated our analysis on a second category antivirals to treat genital herpes

Our findings reveal that detailing primarily affects the brand share positively, in contrast, DTC has a significant, positive effect on both brand share and category sales Detailing ROIs are greater than DTC ROIs Furthermore, there is a synergy between the effects of the two promotional variables on brand share We find that changes in detailing have a greater impact on DTC ROI than vice versa (i e , changes in DTC have a smaller impact on detailing ROI) In addition, we find significant interaction effects between price and promotional expenditures, and we quantify the impact of these interactions on detailing and DTC ROIs Next, long-term ROIs are several times greater than single-period ROIs, for example, for DTC, they are approximately five times greater

A feature of DTC is that it is less "targeted" than detailing, that is, whereas the detailing activity ensures that the target physician is appropriately informed, DTC does not have the power to ensure a 100% reach to target (potential) patients Consequently, it may not be surprising that DTC ROI is less than that of detailing However, what is more surprising is the industry's increasing expenditures on DTC despite the relatively poor short-term returns Our analysis suggests that a positive interaction between DTC and detailing may be a reason for increased expenditures, however, other potential reasons for the expenditures are worth exploring

Therefore, further research should explore alternative paths by which DTC affects sales and should consider measuring the impact of different media used in DTC Further research will also help characterize the extent of strategic interactions (i e , levels of competition and cooperation) among brands These issues underscore the importance of investigating firms' optimal budget allocation problems Overall, our analysis provides a valuable benchmark for further research, and as our brief discussion suggests, much work remains to be done in this important area of marketing

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A Customer Lifetime Value Framework for Customer Selection and Resource Allocation Strategy

The authors evaluate the usefulness of customer lifetime value (CLV) as a metric for customer selection and marketing resource allocation by developing a dynamic framework that enables managers to maintain or improve customer relationships proactively through marketing contacts across various channels and to maximize CLV simultaneously The authors show that marketing contacts across various channels influence CLV nonlinearly Customers who are selected on the basis of their lifetime value provide higher profits in future periods than do customers selected on the basis of several other customer-based metrics The analyses suggest that there is potential for improved profits when managers design resource allocation rules that maximize CLV Managers can use the authors' framework to allocate marketing resources efficiently across customers and channels of communication

Customer lifetime value (CLV) is rapidly gaining acceptance as a metric to acquire, grow, and retain the "right" customers in customer relationship management (CRM) However, many companies do not use CLV measurements judiciously Either they work with undesirable customers to begin with, or they do not know how to customize the customer's experience to create the highest value (Thompson 2001) The challenge that most marketing managers currently face is to achieve convergence between marketing actions (e g , contacts across various channels) and CRM Specifically, they need to take all the data they have collected about customers and integrate them with how the firm interacts with its customers In the academic literature, Berger and colleagues (2002) support the allocation of resources to maximize the value of the customer base, and they strongly argue that such resource allocation models are needed

Maximizing CLV

Some researchers have recommended CLV as a metric for selecting customers and designing marketing programs (Reinartz and Kumar 2003, Rust, Zeithaml, and Lemon 2004) However, there is no empirical evidence as to the usefulness of CLV compared with that of other customer-based metrics Table 1 compares the CLV framework proposed in this study with the existing literature on CLV and database marketing A comparison of the studies listed in Table 1 shows that most of the previous studies provide guidelines for calculating CLV and return on investment at the aggregate level Some recent studies (Reinartz and Kumar 2003, Rust, Zeithaml, and Lemon 2004) provide empirical evidence for the existence of a relationship between marketing actions and CLV at the aggregate level However, as Berger and colleagues (2002) state, none of the studies has proposed and tested a framework that provides rules for resource allocation across various channels of communication for each individual customer and across customers

On the basis of the comparisons in Table 1, we summarize the significant contributions of our study as follows We provide a framework for measuring CLV that links the influence of communications across various channels on CLV We also evaluate the usefulness of CLV as a metric for customer selection and develop a framework for marketing resource allocation that maximizes CLV Given the assumed link between CLV and firm profitability (Hogan et al 2002), these are important issues

In this study, we use customer data from a large business-to-business (B2B) manufacturer to illustrate the proposed framework empirically The customer database of the organization focuses on B2B customers Our analyses show that marketing communications across various channels influence CLV nonlinearly The results from our analyses suggest that customers selected on the basis of CLV provide higher profits than do customers selected on the basis

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TABLE 1
Comparing the Proposed CLV Framework with Existing Models

Type of Model	Representative Research	Return on Investment Modeled and Calculated	CLV Calculation	How Marketing Communication Affects CLV	CLV-Based Resource Allocation	Resource Allocation for Each Customer	Resource Allocation Across Channels	Comparison of Customer-Based Metrics	Statistical Details
CLV	Berger and Nasr (1998)	No	Yes	Yes	No	No	No	No	Yes
	Berger et al (2002)	Yes	Yes	Yes	Yes	No	Yes	No	No
Customer equity	Blattberg and Deighton (1996)	Yes	Yes	No	Yes	No	No	No	Yes
	Libai, Narayandas, and Humby (2002)	Yes	Yes	Yes	No	No	No	No	No
Database marketing	Reinartz and Kumar (2000)	Yes	Yes	No	No	No	No	No	Yes
	Bolton, Lemon, and Verhoef (2004)	Yes	Yes	Yes	No	No	No	No	Yes
CLV antecedents	Reinartz and Kumar (2003)	Yes	Yes	Yes	No	No	No	Yes	Yes
	Rust, Zeithaml, and Lemon (2004)	Yes	Yes	Yes	No	No	No	Yes	Yes
CLV-based resource allocation	Berger and Bechwati (2001)	Yes	Yes	Yes	Yes	No	No	No	No
	Present Study	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

of other widely used CRM metrics In addition, there is the potential for substantial improvement in profits when managers design resource allocation rules that maximize CLV

In the next section, we develop the framework for the measurement and maximization of CLV We then propose hypotheses about the influence of supplier-specific factors and customer characteristics on the various CLV components In the subsequent section, we explain the models and data we used to estimate CLV We then discuss the results from our analyses and explain the comparison of CLV with other metrics for customer selection Specifically, we compare the aggregate profits provided by high-CLV customers with those of customers who score high on several other customer-based metrics In the section "Resource Allocation Strategy," we provide details on allocating resources that maximize CLV Our objective there is to evaluate the extent to which CLV, and thus profits, can be increased by allocating marketing resources across channels of contact for each customer so as to maximize his or her respective CLVs Finally, we derive implications based on the results, discuss the limitations of our study, and identify areas for further research

CLV Measurement and Maximization

The various components of CLV include purchase frequency, contribution margin, and marketing costs (however, the various CLV components can vary depending on the industry) Some of the antecedents of purchase frequency and contribution margin (e g , marketing communications) are under management's control and affect the variable costs of managing customers We use these antecedents to maximize CLV

Objective Function: CLV

Typically, CLV is a function of the predicted contribution margin, the propensity for a customer to continue in a relationship (customer retention), and the marketing resources allocated to the customer In general, CLV can be calculated as follows

$$(1)\quad \text{CLV}_i = \sum_{t=1}^{n} \frac{(\text{Future contribution margin}_{it} - \text{Future cost}_{it})}{(1+r)^t},$$

where

i = customer index,
t = time index,
n = forecast horizon, and
r = discount rate

In contractual settings, managers are interested in predicting customer retention, or the likelihood of a customer staying in or terminating a relationship However, in noncontractual settings, the focus is more on predicting future customer activity because there is always a chance that the customer will purchase in the future Therefore, managers who calculate CLV in noncontractual settings are interested in predicting future customer activity and the predicted contribution margin from each customer Previous researchers have used the variable P(Alive), which represents the probability that a customer is alive (and thus exhibits purchase activity) given his or her previous purchase behavior (Reinartz and Kumar 2000), to predict future customer activity in noncontractual settings However, the measure assumes that when a customer terminates a relationship, he or she does not return to the supplier This is also called the "lost-for-good" scenario (Rust, Zeithaml, and Lemon 2004) If a customer is won back after termination, the company treats the customer as a new customer and ignores its history with the customer

Another method for predicting future customer activity is to predict the frequency of a customer's purchases given his or her previous purchases The assumption underlying this framework is that customers are most likely to reduce their frequency of purchase before terminating a relationship This assumption is in accordance with theories about the different phases in a relationship and relationship life cycles (Dwyer, Schurr, and Oh 1987, Jap 2001) In addition, such a methodology enables a customer to return to the supplier after a temporary dormancy in a relationship Thus, in this framework, we measure CLV by predicting the purchase pattern (purchase frequency or interpurchase times) over a reasonable period This is also called the "always-a-share" scenario The lost-for-good approach is questionable because it systematically understates CLV (Rust, Zeithaml, and Lemon 2004) Thus, we use the always-a-share approach in this study Given predictions of contribution margin, purchase frequency, and variable costs, the CLV function we use can be represented as follows

$$(2)\quad \text{CLV}_i = \sum_{y=1}^{T_i} \frac{\text{CM}_{i,y}}{(1+r)^{y/\text{frequency}_i}} - \sum_{l=1}^{n} \frac{\sum_m c_{i,m,l} \times x_{i,m,l}}{(1+r)^{l-1}},$$

where

CLV_i = lifetime value of customer i,
$\text{CM}_{i,y}$ = predicted contribution margin from customer i (computed from a contribution margin model) in purchase occasion y, measured in dollars,
r = discount rate for money (set at 15% annual rate in our study),
$c_{i,m,l}$ = unit marketing cost for customer i in channel m in year l (the formulation of CLV does not change if l is used to represent periods other than one year),
$x_{i,m,l}$ = number of contacts to customer i in channel m in year l,
frequency_i = predicted purchase frequency for customer i,
n = number of years to forecast, and
T_i = predicted number of purchases made by customer i until the end of the planning period

In addition to accurate measurement of CLV for each customer, our objective is to allocate resources so as to maximize CLV Thus, we model the purchase frequency and contribution margin of customers as a function of marketing resource variables such as channel contact. We then use the customer responsiveness to marketing actions, obtained from the purchase frequency and contribution margin models, to develop resource allocation strategies that maximize CLV. In summary, the objective is to identify the resource allocation rules across various channels of communication for each individual customer such that the respective CLVs (as provided in Equation 2) are maximized.[1] Our objective function is subject to the following constraints: frequency > $0 \; \forall \; i, t$, and $x_{i,m,l} \geq 0 \; \forall \; i, m, l$.

Discounting contribution margin. We first focus on the discounting of contribution margin over a period of time. Assume that it is currently year $l = 1$ and that we need to forecast the contribution margin from each customer for the next n years (i.e., until $l + n$). It is possible that a customer makes several purchases in a given year. Berger and Nasr (1998, Equation 2) and Rust, Zeithaml, and Lemon (2004) provide guidelines for discounting contribution margin from customers when there is more than one purchase occasion (y) per year. In this approach, the discount rate from a customer is scaled according to his or her frequency of purchase (as is shown in Equation 2). For example, consider when the planning horizon is one year and the frequency of purchases is two times (frequency = 2). The first purchase occasion (y = 1) occurs after 6 months; therefore, y/frequency = .5 (in other words, we use the square root of the discount rate). The second purchase occasion (y = 2) occurs after 12 months; therefore, y/frequency = 1.

Discounting cost allocations. The discounting of cost allocations is straightforward if we assume that there is a yearly allocation of resources (as is the case in most organizations) and that the cost allocation occurs at the beginning of the year (the present period). Thus, the cost allocation in the first year need not be discounted, the cost allocation in the second year needs to be discounted for one year, and so on. Thus, we raise the denominator in the cost function calculation to current year – 1 (i.e., $l - 1$).

Discussion of model constraints. The constraints ensure the nonnegativity of the predicted purchase frequency and communication levels for each customer i during period l.

Antecedents of Purchase Frequency and Contribution Margin

Purchase Frequency

An objective of relationship marketing is to ensure future purchase activity. Purchase frequency is also a component of our CLV calculation. Therefore, as the basis for selecting antecedents to predict purchase frequency, we use the commitment–trust theory of relationship marketing (Morgan and Hunt 1994) as well as previous research in customer equity and CLV (Bolton, Lemon, and Verhoef 2004; Bowman and Narayandas 2001; Reinartz and Kumar 2003; Rust, Zeithaml, and Lemon 2004) and channel communications (Grewal, Comer, and Mehta 2001; Mohr and Nevin 1990; Morgan and Hunt 1994; Rindfleisch and Heide 1997).

The overall theoretical framework that we used is provided in Figure 1. We summarize the antecedents of purchase frequency, their operationalization, expected effects, and the rationale for our expectations in Table 2. Next, we provide a detailed discussion for a few of the hypotheses that are unique to our study.

Supplier-Specific Factors: Channel Communications

In this study, we classify channels of communication into the following contact modes: rich (e.g., face-to-face, trading event meetings), standardized (e.g., direct mail, telephone), and Web based (Mohr and Nevin 1990). Although we expect the relationships between different channels of communication and predicted customer activity to be similar, we need to analyze customer responses separately across different channels because the costs of serving customers across different channels are different, and customers might exhibit different responsiveness across the various channels. The costs of communication in each channel can influence managers' frequency of communication in each channel.

Frequency of rich and standardized modes. Face-to-face communications and trading event meetings are the richest and most direct mode of communication possible among channel members (Mohr and Nevin 1990). Relational customers tend to have high commitment and trust with their suppliers, which results in less uncertainty, more cooperation, and less complexity in their relationships than in those of transactional customers (Morgan and Hunt 1994). Rich modes of communication are preferred to standardized modes when issues in the channel structure are complex and when there is a high degree of uncertainty in the relationship. Rich modes of communication are also effective in converting transactional customers to relational ones (Ganesan 1994).

Direct mail and telephone communication are the most standardized and cost-effective modes of individual-level communication available to an organization. Standardized modes are also the most cost-effective method for identifying customers who are interested in an organization's current promotion (Shepard 2001). For transactional customers, direct mail can be used in combination with telephone sales to generate interest in products while simultaneously improving the return on investment (Nash 1993). For relational customers, direct mail serves to maintain commitment and trust by communicating relationship benefits (Morgan and Hunt 1994) and to inform the best customers about new product offerings. Therefore, although the purpose of standardized communication may be different for transactional customers than for relational ones, we expect that the marginal response for increased frequency is the same across segments.

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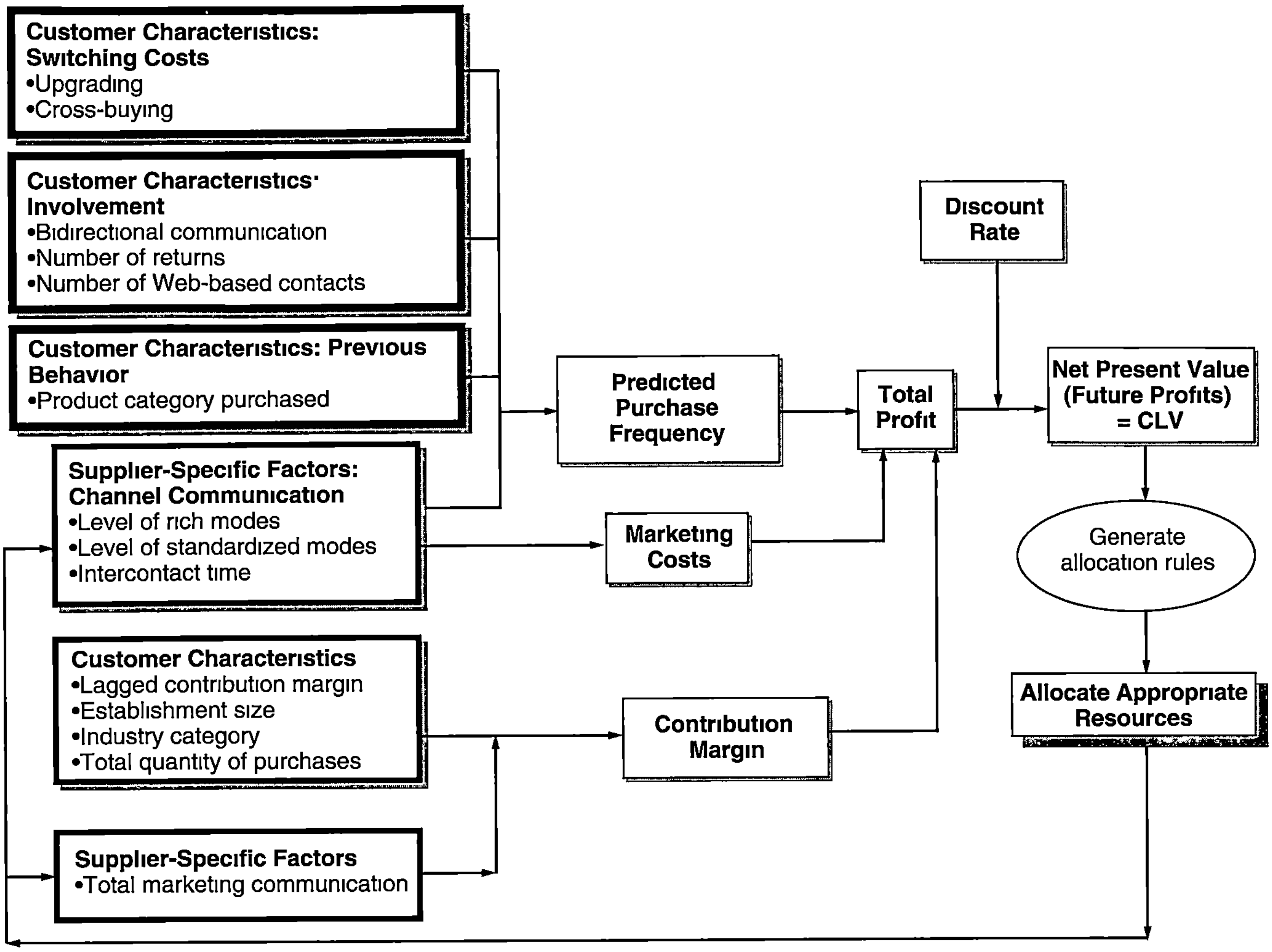
[1] In this study, we do not use a budget constraint on the total resources available for contacting customers. Therefore, we are interested only in allocating resources across channels for each individual customer (i.e., within each customer across channels). However, our framework can be applied to allocate resources across channels with each individual customer and across customers in the presence of a budget constraint.

FIGURE 1
A Conceptual Framework for Measuring and Using CLV


Customer Characteristics: Switching Costs
•Upgrading
•Cross-buying
Customer Characteristics: Involvement
•Bidirectional communication
•Number of returns
•Number of Web-based contacts
Customer Characteristics: Previous Behavior
•Product category purchased
Supplier-Specific Factors: Channel Communication
•Level of rich modes
•Level of standardized modes
•Intercontact time
Customer Characteristics
•Lagged contribution margin
•Establishment size
•Industry category
•Total quantity of purchases
Supplier-Specific Factors
•Total marketing communication
Predicted Purchase Frequency
Marketing Costs
Contribution Margin
Total Profit
Discount Rate
Net Present Value (Future Profits) = CLV
Generate allocation rules
Allocate Appropriate Resources

However, it has been proposed that too much communication causes a relationship to be dysfunctional (Fournier, Dobscha, and Mick 1997). In addition, the marginal response to a higher level of rich modes of communication need not always be higher; sometimes, it even can be negative. Although the utility of marketing contacts is not questioned, too much contact can overload buyers and have dysfunctional consequences (e.g., ubiquitous junk mail). Thus:

> H_1: An inverted U-shaped relationship exists between the frequency of rich and standardized modes of communication and a customer's predicted purchase frequency.

Intercontact time. Following the theory that leads to H_1, we expect that there exists an optimal level of intercontact time between suppliers and buyers. Higher levels of previous communications lead to trust with the supplier and act as glue that holds together a communication channel (Morgan and Hunt 1994). However, too much communication may be dysfunctional. In addition, the marginal utility of an additional piece of information from a supplier firm in a short period is low. To maximize the effect of each contact, supplier firms need to pace their communication schedule to suit customer needs. Thus:

> H_2: An inverted U-shaped relationship exists between intercontact time and a customer's predicted purchase frequency.

Customer Characteristics: Customer Involvement

Bidirectional communication. Research on channel communications shows that highly relational channel structures are associated with large bidirectional communications among channel members (Mohr and Nevin 1990). Although customer-initiated contacts are associated primarily with complaints in business-to-consumer settings, the same is not necessarily true for B2B settings. In a B2B setting, customers can initiate contacts with suppliers for several reasons, such as if they have new needs that the supplier may be able to fulfill, if they want the supplier to conduct training programs at the customer's site (Cannon and Homburg 2001), or if the supplier invites the customer to participate in new product development sessions. On most occasions, bidirectional communication in channels strengthens a relationship, indicates customer involvement,

TABLE 2
Antecedents, Covariates, and Expected Effects

Variable	Operationalization	Expected Effect	Rationale
Purchase Frequency Model			
Antecedents			
Upgrading	Number of product purchase upgrades until an observed purchase	+	Customers who upgrade have higher switching costs with each upgrade, which can lead to lower propensity to leave and higher recurrent needs (Bolton, Lemon, and Verhoef 2004)
Cross-buying	Number of different product categories a customer has purchased	+	Customers who purchase across several product categories have higher switching costs and recurrent needs (Bowman and Narayandas 2001, Reinartz and Kumar 2003)
Bidirectional communication	Ratio of number of customer-initiated contacts to total number of customer contacts (customer initiated and supplier initiated) between two observed purchases	+	Two-way communication between parties strengthens the relationship and ensures that the focal firm is recalled when a need arises (Morgan and Hunt 1994)
Returns	Number of products the customer returns between two observed purchases	∩	Returns provide an opportunity for firms to satisfy customers and ensure repeat purchases (Reinartz and Kumar 2003), but too many purchases can be detrimental to the relationship and can indicate that the firm has not used the return opportunities appropriately
Frequency of Web-based contacts	Number of times in a month the customer contacts the supplier through the Internet between two observed purchases	+	Customers who use online communication want transaction efficiencies, and customers who want to create efficiencies are highly relational and have recurring needs (Grewal, Corner, and Mehta 2001, Rindfleisch and Heide 1997)
Relationship benefits	Indicator variable of whether a customer is a premium service member (based on revenue contribution in the previous year)	+	Acknowledgment of customers with relationship benefits reduces the propensity of customers to quit and increases the probability that the focal firm is recalled when a need arises (Morgan and Hunt 1994)
Frequency of rich modes of communication	Number of customer contacts by the supplier in a month (through sales personnel) between two observed purchases	∩	Timely communication between parties reduces the propensity of a customer to quit a relationship (Mohr and Nevin 1990, Morgan and Hunt 1994), but too much communication can be detrimental to the relationship (Fournier, Dobscha, and Mick 1997, Nash 1993), thus, there is an optimal communication level
Frequency of standardized modes of communication	Number of customer contacts by the supplier in a month (through telephone or direct mail) between two observed purchases	∩	
Intercontact time	Average time between two customer contacts by the supplier across all channels of communication between two observed purchases	∩	A long time between contacts can lead to forgetfulness, but contacts that are too soon can cause dysfunction

TABLE 2
Continued

Variable	Operationalization	Expected Effect	Rationale
Covariate			
Product category	Two indicator variables one indicates a hardware purchase, the other indicates a software purchase		A customer's purchase patterns may depend on the product category purchased
Contribution Margin Model			
Antecedents			
Lagged contribution margin	Customer's contribution margin from the previous year	+	Previous revenue is a good predictor of current revenue and accounts for any model misspecification (Niraj, Gupta, and Narasimhan 2001)
Total marketing efforts	Total number of customer contacts across all channels	+	Previous marketing communications and depth (quantity) of purchases positively affect contribution margin (Gupta 1988, Tellis and Zufryden 1995)
Total quantity purchased	Total quantity of products the customer purchased across all product categories	+	
Covariates			
Size of firm	Number of employees in the customer firm	+	Control variables that accommodate for customer heterogeneity (Niraj, Gupta, and Narasimhan 2001)
Industry category	Standard industrial classification–based industry category to which the customer firm belongs		

Notes For the purchase frequency model, the dependent variable is purchase frequency, for the contribution margin model, the dependent variable is contribution margin

and increases interdependence among channel members (Ganesan 1994, Mohr and Nevin 1990) Thus

> H_3 The higher the level of bidirectional communication, the higher is a customer's predicted purchase frequency

Frequency of Web-based contacts In this study, we analyze Web-based contacts separately from other channels of communication because Web-based communication is customer initiated (i e , a passive mode of operation for the supplier) However, there are several advantages to tracking Web-based contacts in a B2B setting First, Web-based communication between buyers and suppliers is the most cost-effective method of communication Second, Web-based contacts from the buyers provide some important signals to the supplier about the buyer's relationship orientation Grewal, Corner, and Mehta (2001) find that organizations enter and actively participate in electronic markets if their motivation is to improve efficiency in transactions In addition, participation in electronic markets (or use of Web-based initiatives) improves transaction effectiveness and efficiency (Rindfleisch and Heide 1997) Efficiency of communication and transactions among channel members is associated with a relational structure and higher customer involvement (Mohr and Nevin 1990, Sheth and Parvatiyar 1995) Thus

> H_4 The higher the number of Web-based contacts from a customer, the higher is the customer's predicted frequency of purchase

Contribution Margin

The antecedents that we adopt to predict contribution margin are based on findings from previous research on antecedents of customer revenue (Niraj, Gupta, and Narasimhan 2001) and purchase quantity (Gupta 1988, Tellis and Zufryden 1995) As with purchase frequency, we classify the antecedents of contribution margin as supplier-specific factors (total marketing efforts) and customer characteristics (lagged contribution margin and purchase quantity) We use size of an establishment and industry category as covariates in our model In Table 2, we provide a description of the antecedents that we propose influence customer purchase frequency and contribution margin In the database, we also provide the operationalization of the antecedents, their expected effects, and the rationale for our expectations based on previous research Because all the antecedents we use in our contribution margin model are based on previous research and findings, we do not discuss the hypotheses in detail In Table 2, we provide a description of the covariates we use as control variables in the purchase frequency and contribution margin models

Modeling CLV and Data

Model Development

To predict CLV, we need a stochastic model to predict each customer's purchase frequency and a panel-data model that predicts contribution margin. In this study, we assume that the amount a customer spends is independent of purchase timing. This is a rather restrictive assumption for frequently bought consumer goods (Tellis and Zufryden 1995). However, in our product category, we find that the correlation between purchase frequency and contribution margin is not significant.

Purchase Frequency

We model a customer's purchase frequency using the generalized gamma model of interpurchase timing that Allenby, Leone, and Jen (1999) developed. The generalized gamma model also accommodates the commonly used exponential distribution for interpurchase times (Reinartz and Kumar 2003). The likelihood function for the purchase frequency model is given as follows:

$$L = \prod_{i=1}^{n}\prod_{j=1}^{J_i}\sum_{k=1}^{K} \Phi_{ijk} f_k\left(t_{ij}|\alpha_k, \lambda_{ik}, \gamma_k\right)^{c_{ij}} S_k(t_{ij}|\alpha_k, \lambda_{ik}, \gamma_k)^{(1-c_{ij})}, \tag{3}$$

where

$f(t_{ij}|\alpha, \lambda_i, \gamma)$ = the density function for the generalized gamma distribution (i.e., the probability of the jth purchase for customer i occurring at period t, given α, λ_i, γ),

$S(t_{ij}|\alpha, \lambda_i, \gamma)$ = the survival function for the generalized gamma distribution (i.e., the probability of the jth purchase for customer i occurring at a given period is greater than t, given that the jth purchase has not occurred until time t, given α, λ_i, γ),

c_{ij} = the censoring indicator, where $c_{ij} = 1$ if the jth interpurchase time for the ith customer is not right-censored, and $c_{ij} = 0$ if the jth interpurchase time for the ith customer is right-censored,

Φ_{ijk} = the probability of observation j for the ith customer belonging to subgroup k, and

α, λ_i, γ = the parameters of the generalized gamma distribution.

Because we use a generalized gamma distribution to model interpurchase time and the likelihood function in Equation 3, the expected time until next purchase is given as follows:

$$\sum_k \Phi_{ik} \times \left\{\left[\Gamma\left(\alpha_k + \frac{1}{\gamma_k}\right)\right] \Big/ \Gamma(\alpha_k)\right\} \times \lambda_{ik} \tag{4}$$

The ratio of 12 (because we use months as the unit of analysis) to the expected time until next purchase (which we obtain by modeling a generalized gamma distribution on the interpurchase times, as is shown in the work of Allenby, Leone, and Jen [1999]) gives the predicted purchase frequency. The parameters α and γ establish the shape of the interpurchase time distribution, and λ_i is the individual-specific purchase rate parameter. We assume that the population consists of k subgroups, and Φ_{ik} provides the mass point (i.e., weight) for each subgroup. We model the probability of a customer belonging to each subgroup Φ_{ik} as a probit function of the antecedents and covariates of purchase frequency. Specifically, we represent the link function as $\Phi_{ik} = f(x_{ij}\beta_i)$, where x_{ij} represents the antecedents and covariates of purchase frequency for customer i in purchase occasion j, and β_i represents the customer-specific response coefficients.

Our model framework, as presented in Equation 3, resembles a hierarchical Bayes formulation of the concomitant continuous mixture model. To address the issue of endogeneity, we use the one-period lagged value for all the antecedents and covariates in our analysis (Villas-Boas and Winer 1999). However, to account for any extraneous factors, we also use the log of the lagged interpurchase.[2] The specification of the model enables us to estimate individual customer-level coefficients for the influence of the covariates on the probability of a customer belonging to a particular subgroup and thus interpurchase times.

Contribution Margin

We model the contribution margin from a customer using panel-data regression methodologies. We needed to address endogeneity issues while using lagged contribution margin as an independent variable in our model. In panel-data models with lagged dependent variables, the endogeneity in formulation can be alleviated with a one-period difference in the dependent variable and a two-period lagged dependent variable as an independent variable (Baltagi 1998). We use the growth in contribution margin from period t – 1 to t as the dependent variable and the contribution margin in period t – 2 as an independent variable. The other independent variables we used are specific to period t – 1 (this also accommodates the issue of endogeneity). The independent variables in the contribution margin model are thus lagged contribution margin, lagged total quantity purchased, lagged firm size, industry category, and lagged total marketing efforts. Thus, the contribution margin model is

$$\Delta CM_{i,t} = \beta_0 + \beta_1 CM_{i,t-2} + \beta_2 Quantity_{i,t-1} + \beta_3 Size_{i,t-1} + \Sigma_j \beta_j Industry_j + \beta_4 Totmark_{i,t-1} + e_{i,t}, \tag{5}$$

where

$\Delta CM_{i,t}$ = difference in contribution margin from period t – 1 to period t for customer i, measured in dollars,

$Size_{i,t-1}$ = firm size for customer i in period t – 1, measured as number of employees,

Industry = indicator variable for industry category of the customer firm,

$Totmark_{i,t-1}$ = total number of contacts made to customer i in period t – 1,

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[2] We also used lagged interpurchase time instead of the log of the lagged interpurchase time, and we did not find any difference in the substantive conclusions. We used log of the lagged interpurchase times because lagged interpurchase times can have a threshold effect on the influence of current interpurchase times (Allenby, Leone, and Jen 1999). The log of the lagged interpurchase time achieved this objective in scaling the tail of the lagged interpurchase time distribution.

$\text{Quantity}_{i,t-1}$ = total quantity of products bought by customer i in period t − 1,
$e_{i,t}$ = error term,
i = index for the customer, and
t = index for time

Data

We used data from a large multinational computer hardware (servers, workstations, and personal computers) and software (integration and application) manufacturer for the empirical application of our framework The company's database focuses on business customers The product categories in the database represent different areas of high-technology products In addition, for these product categories, it is the choice of the buyer and seller to develop their relationships, and there are significant benefits for both parties to maintain a long-standing relationship The choice of vendors for the products is normally made after much deliberation by the buyer firm Even though the firm's products are durable goods, they require constant maintenance and frequent upgrades, which provides the variance required in modeling customer response For our analyses, we used two cohorts of customers Cohorts 1 and 2 We assigned customers to Cohort 1 (Cohort 2) if their first purchase with the manufacturer occurred in the first quarter of 1997 (first quarter of 1998) In our samples, we removed customers who had missing values for either rich or standardized modes of communication We also restricted our sample to customers who had made at least five purchases Overall, we removed 20% of the original cohort of customers for our analyses, which resulted in an effective sample size of 1316 and 873 observations for customers in Cohorts 1 and 2, respectively The interpurchase time for customers in Cohort 1 ranges from 1 5 to 23 months, for Cohort 2, it ranges from 1 month to 20 months

Purchase frequency model We used each observed purchase for a customer as an observation in the purchase frequency model For Cohort 1, we selected customers who made their first purchase in the first quarter of 1997 For each customer, we omitted the first observed purchase in our analysis sample because the first observed purchase is restricted to be within three months for all customers in the cohort, and theoretically the customer retention phase begins after the first purchase The antecedents and covariates we used can be classified as cumulative and current effects The cumulative effects antecedents include cross-buying and upgrading, and their values represent the total number of different products (for cross-buying) or upgrades that the customer has purchased since the first purchase until the current observed purchase

The current-effects antecedents include bidirectional communication, returns, relationship benefits, frequency of rich, standardized, and Web-based contacts, and intercontact time The covariates in the purchase frequency model (type of product purchased) can be classified as current effects We calculated the current-effects antecedents and covariates on the basis of the activities of the customer or the supplier (in the case of channel communications) between the previous observed purchase (j − 1) and the current observed purchase (j) To assess the inverted U-shaped relationships, we used a quadratic conversion (including the square covariate term in Equation 3) of the respective antecedent For all customers, we used the interpurchase times until the end of 2000 as our calibration sample We used the 2001 data as a holdout sample and to compare strategies All the antecedents and covariates we used in our analyses are lagged variables Specifically, for observed purchase j, the cumulative-effects antecedents represent the customer's activity since relationship initiation until observed purchase j − 1 Similarly, for observed purchase j, the current effects antecedents and covariates represent the customer's (or supplier's) activity between observed purchases j − 2 and j − 1

Contribution margin model To model contribution margin from a customer, we used the annual sales from various purchases of each customer For customers in Cohort 1, we used the annual sales from each customer from 1997 to 2000 Given our model structure in Equation 5, there are two observations per customer in our analysis sample Specifically, for each customer, for Observation 1 the dependent variable is the difference in contribution margin between 2000 and 1999, and the independent variables include the contribution in 1998, the firm size in 1999, the industry category of the customer, the total number of contacts made to the customer in 1999, and the total quantity of products purchased in 1999 Similarly, for Observation 2, the dependent variable is the difference in contribution margin between 1999 and 1998, and the independent variables include the contribution margin in 1997 As we stated previously, we used the 2001 data as a holdout sample and to compare strategies The descriptive statistics for the data and the correlation matrix of the antecedents are provided in Table 3

Results from Estimation of CLV

Purchase Frequency Model

As we discussed previously, we used an effective sample size of 1316 and 873 observations that belong to Cohort 1 (first purchase in 1997) and Cohort 2 (first purchase in 1998), respectively, for our analyses We discuss the results from Cohort 1 in detail in the text The results from Cohort 2 are quite similar to those of Cohort 1 and are provided along with the results for Cohort 1 in the corresponding tables We censored our data set in 2000 and used the 2001 data as our validation (or holdout) sample in both cohorts We estimated the purchase frequency model in Equation 3 using Markov chain Monte Carlo (MCMC) methods The results from the purchase frequency model for Cohorts 1 and 2 are provided in Table 4 (for details on the model estimation, model selection, model performance, and support for hypotheses, see Appendix A) The coefficients of the antecedents reported in Table 4 are the means from the posterior samples of β_i, and the signs for the coefficients represent their influence on a customer's purchase frequency There are several insights that we derive from Table 4, which we discuss subsequently

Model fit The results show that the generalized gamma model with two subgroups provides a good fit to the data

TABLE 3
Descriptive Statistics and Correlation Matrix

Variable	Mean	Standard Deviation	Purchase Frequency	Upgrading	Cross-Buying	Bidirectional Communication	Returns	Frequency of Web-Based Contacts	Relationship Benefit–Premium Service Level	Frequency of Rich Modes	Frequency of Standardized Modes	Intercontact Time (Days)
Purchase Frequency Model												
Purchase frequency	5 (4 5)	8 4 (6 8)	1									
Upgrading	1 32 (1 16)	89 (91)	62***	1								
Cross-buying	2 58 (3 13)	1 7 (1 5)	53***	39*	1							
Bidirectional communication	84 (62)	2 41 (3 52)	68***	51*	48*	1						
Returns	91 (86)	3 7 (2 81)	36***	09	13	11*	1					
Frequency of Web-based contacts	3 88 (4 37)	25 81 (24 94)	40***	21	15	17**	06	1				
Relationship benefit–premium service level	09 (12)	29 (25)	41***	31**	36**	22	– 21*	25	1			
Frequency of rich modes	1 79 (1 52)	5 69 (5 84)	45***	15**	29**	32*	05	34*	07	1		
Frequency of standardized modes	20 74 (22 81)	47 75 (45 81)	44***	22*	34*	24**	07	32*	19*	30**	1	
Intercontact time (days)	15 3 (16 1)	13 8 (14 2)	51***	– 08	06	– 01	– 01	– 04	– 03	– 11	06	1

TABLE 3
Continued

Variable	Mean	Standard Deviation	Growth in Contribution Margin	Lagged Contribution Margin	Total Marketing Efforts	Total QuantityPurchase
Contribution Margin Model						
Growth in contribution margin	4955 (4827)	417,270 (381,297)	1			
Lagged contribution margin	31,143 (32,825)	323,139 (318,867)	–78***	1		
Total marketing efforts	3 49 (4 5)	17 26 (16 24)	61***	08*	1	
Total quantity purchased	1 89 (2 01)	13 40 (14 02)	71***	05**	07	1

*Significant at $\alpha = 10\%$
**Significant at $\alpha = 5\%$
***Significant at $\alpha < 1\%$

Notes The frequency of rich, standardized, and Web-based contacts represents the frequency of the respective mode of communication between two consecutive purchases Values in parentheses for the descriptive statistics represent Cohort 2 The correlation matrix for Cohort 2 is similar to that of Cohort 1 and is available on request from the authors We do not report the correlation matrix of the covariates because it does not have any substantive interpretation

TABLE 4
Coefficients for the Generalized Gamma Purchase Frequency Models

Variable	Model 1 (Generalized Gamma Without Mixture)	Model 2 (Generalized Gamma with Mixture, Without Temporal Variation)	Model 3 (Generalized Gamma with Mixture and Temporal Variation)
Component 1			
α_1	3.05 (4.12)**	4.1 (4.2)**	3.27 (3.59)**
υ_1	26.18 (25.08)**	42.97 (43.82)**	47.05 (48.90)**
θ_1	.007 (.002)**	.01 (.08)**	.04 (.02)**
γ_1	1.2	1.2 (1.3)	1.2 (1.5)
Mass point		.54 (.55)	.54 (.56)
Component 2			
α_2		.58 (1.57)**	1.48 (3.61)**
υ_2		38.21 (34.28)**	32.07 (49.02)**
θ_2		.008 (.012)**	.005 (.001)**
γ_2		.9 (.9)	.9 (.9)
Mass point		.46 (.45)	.46 (.44)
Coefficients			
β_{01}		.89 (–1.52)**	–2.05 (–2.51)*
Lagged log interpurchase time			–2.09 (–2.85)**
Antecedents: Customer Characteristics			
Upgrading			5.01 (5.62)**
Cross-buying			6.08 (6.92)**
Bidirectional communication			1.49 (1.01)**
Returns			10.52 (9.98)**
(Returns)^2			–3.84 (–4.01)*
Frequency of Web-based contacts			3.52 (2.38)**
Antecedents: Supplier-Specific Factors			
Relationship benefits			9.78 (7.65)**
Frequency of rich modes of communication			4.50 (5.65)**
(Frequency of rich modes of communication)^2			–1.30 (–1.28)**
Frequency of standardized modes of communication			6.53 (7.02)**
(Frequency of standardized modes of communication)^2			–.28 (–.53)**
Intercontact time			9.64 (8.56)**
(Intercontact time)^2			–3.21 (–4.05)**
Log-likelihood	–3298.91 (–3627.08)	–2908.66 (–3297.04)	–2237.82 (–2437.91)
AIC	–6606 (–7262)	–5825 (–6602)	–4484 (–4884)
BIC	–6639 (–7295)	–5910 (–6687)	–4683 (–5083)
Relative absolute error	.95 (.91)	.84 (.80)	.51 (.53)

*Posterior sample values between the 2.5th and 97.5th percentile do not contain zero.
**Posterior sample values between the .5th percentile and 99.5th percentile do not contain zero.
Notes: Values in parentheses represent Cohort 2. The product category variable was not significant in our analysis, and thus we do not include it here. Relative absolute error is with respect to a moving average model. The significance levels apply to the coefficients of Cohorts 1 and 2.

and is better than other models for modeling purchase frequency (log-likelihood for Model 3 = –2237.82, Akaike information criterion [AIC] = –4484, and Bayesian information criterion [BIC] = –4683). We also used a hazard model with the finite mixture framework (Kamakura and Russell 1989) to model purchase frequency, and we found that our proposed model fits the data better and has better predictive capabilities.

Distribution parameters.[3] The mean expected purchase frequency for Subgroup 1 is 4.2 purchases in a year, and the mean expected purchase frequency for Subgroup 2 is 1 01 purchases in a year Given the variation in expected purchase frequencies in each subgroup, we term Subgroup 1 the "active state" and Subgroup 2 the "inactive state" The component masses for Subgroup 1 (φ_1) and Subgroup 2 (φ_2) are 54 and 46, respectively This implies that we expect 54% of the customers to be active in the prediction window and 46% of the customers to be inactive in the prediction window

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[3] The parameter estimates of the purchase frequency model are based on mean values from 50 repeats with random starting values for each repetition. We adopted such a procedure to ensure that the parameter estimates are global optimal values and are not affected by any local maxima.

Supplier-specific factors Our analyses indicate that a supplier's contact strategy and provision of relationship benefits significantly affect a customer's predicted purchase frequency We find that the frequency of contacts affects purchase frequency nonlinearly Specifically, we find an inverted U-shaped relationship This leads us to believe that there is an optimal level of marketing communication for each customer A firm's increasing communication beyond a certain threshold may result in diminishing returns in terms of customer purchase frequency This finding also provides the reasoning to determine the optimal level of resources that needs to be allocated across channels to maximize CLV in Phase 2

The coefficients of the marketing contacts reveal a difference in the influence of various channels on customer purchase frequency The coefficient of the quadratic term for rich modes of communication (–1 30 for Cohort 1) is higher than the coefficient of the quadratic term for standardized modes of communication (– 28 for Cohort 1) Thus, we can infer that the rate of diminishing returns (after exceeding the threshold) is much higher for the rich mode of communications than for standardized modes Therefore, although the rich mode of communication is interactive and effective, firms should use it with great caution

Customer characteristics The results indicate that upgrading and cross-buying positively influence a customer's purchase frequency This is in line with the findings of Reinartz and Kumar (2003), who also find that breadth of purchase positively affects a customer's duration in a profitable relationship We also find that the higher the bidirectional communication between the customer and supplier, the higher is the customer's purchase frequency Thus, in addition to timely communication from the supplier to the customer (Morgan and Hunt 1994), communication from a customer can be a good indicator of a customer's activity

With respect to returns from a customer, our analysis suggests that managers need to exercise caution We find support for an inverted U-shaped relationship between purchase frequency and returns This indicates that customers who return products within a threshold are a good asset to the firm The results highlight the importance of firms' recognizing the customers who establish contact through the online channel in their CRM strategies

Contribution Margin Model

We estimated the contribution margin model with annual data from 1997 (t – 4) to 2000 (t) for Cohort 1 and from 1998 to 2000 for Cohort 2[4] The revenue in 2001 (t + 1) acts as a holdout sample for Cohorts 1 and 2 The coefficients of the contribution margin model are provided in Table 5 The main insight from Table 5 is that the contribution margin model provides an adjusted R^2 of 68 and thus can explain significant variation in contribution margin from customers We derive several other insights from Table 5, which we discuss subsequently

Supplier-specific factors Total lagged marketing efforts contribute significantly to an explanation of variation in current contribution margin, which implies that a supplier's contact strategy affects both purchase frequency and contribution margin

Customer characteristics The two-period lagged contribution margin provides the highest contribution to an explanation of current-period contribution margin In addition, lagged quantity of goods is significant in explaining variation in contribution margin Firm size and industry category explain variation in current-period contribution margin Among the various industry categories, firms in the financial services, technology, consumer packaged goods, and government industry categories provide, on average, a higher contribution margin than do firms in other industry categories However, firms in the education industry provide a lower contribution margin than do firms in other industries

Customer Selection Strategy

In this section, we compare the customer selection capabilities of the following CLV, our proposed metric, previous-period customer revenue (PCR), a simple metric, past customer value (PCV), which is widely considered a good

TABLE 5
Regression Results from the Contribution Margin Model

Independent Variable	Parameter Estimate	
Intercept	N S	(N S)
Contribution in t – 2	83***	(85***)
Lagged total quantity purchased	02**	(03**)
Size	02**	(02**)
Aerospace	N S	(N S)
Financial services	02*	(02**)
Manufacturing	N S	(N S)
Technology	03**	(02**)
Consumer packaged goods	03***	(03***)
Education, K–12	– 03***	(– 02***)
Travel	N S	(N S)
Government	02*	(02*)
Lagged total level of marketing effort	04***	(06***)

*Significant at α = 10
**Significant at α = 05
***Significant at α < 01
Notes The reported coefficients are standardized estimates, the values in parentheses represent Cohort 2 N S = not significant

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[4] We also estimated the contribution margin model at the monthly, quarterly, and semiannual levels, but we did not find any significant differences in model performance Thus, to maintain simplicity, we used the contribution margin model with the annual data

predictor of future customer value, and customer lifetime duration (CLD), a forward-looking metric that is also used as a proxy for loyalty (We also compared the customer selection capabilities of CLV with other customer-based metrics, such as share of wallet and recency, frequency, and monetary value The results were similar to the comparison with PCR, PCV, and CLD) In general, organizations in direct marketing situations rank-order their customers on the basis of a particular metric and prioritize their resources from best customers to worst customers on the basis of the rank order (Roberts and Berger 1999) Descriptions of the various customer-based selection metrics used in our analyses are provided in Appendix B

Performance of the Customer Selection Metrics

To compare the performance of the four metrics, we rank-ordered customers from best to worst according to each metric and then compared the sales, costs, and profits from the top 5%, 10%, and 15% of customers We used the data from the first 30 months to score and sort the customers on each metric, as do Reinartz and Kumar (2003) We then compared the actual sales, variable costs of communication, and profits for the top 5%, 10%, and 15% of customers from the censoring period (30 months) until the end of the observation window (48 months) [5] To select customers for contact, in general organizations choose the top 5% to 15% of their customers, rank-ordered on the basis of a scoring metric Selection of more customers to contact may not be feasible because of limited time and resources Thus, to reflect industry practice, we compared the performance of our metric among the top 5%, 10%, and 15% of customers The results are provided in Table 6, and the reported values are cell medians We subsequently summarize the results from our comparison

Overall, Table 6 shows that the proposed metric better identifies profitable customers than do other metrics we compared in the study, such as PCR, PCV, and CLD On the basis of the 18-month prediction window, we expect the average net profits of customers selected from the top 5% using the proposed CLV metric to be $143,295 (after accounting for cost of goods sold [70%] and variable costs of communication), whereas the average net profits are $70,929, $130,785, and $106,389 for the top 5% of the customers selected on the basis of PCR, PCV, and CLD, respectively These findings hold across all the percentage subgroups The results provide substantial support for incorporating the responsiveness of each individual customer across various communication channels and for the usefulness of CLV as a metric for customer scoring and customer selection Although the difference in profits from use of PCR, PCV, CLD, and CLV is, on average, approximately $40,000 for a customer in the top 5% sample, the difference in total profit across the top 5% to 15% of the entire customer base can easily yield more than $1 million

Resource Allocation Strategy

Having evaluated the usefulness of using CLV for customer selection, we now describe our methodology for designing resource allocation strategies that maximize CLV The framework also provides managers a tool for assessing return on marketing investments by identifying avenues for optimal resource allocation across channels of communication for each individual customer (and possibly across customers), so as to maximize CLV The marketing literature has provided guidelines for optimal resource allocation in acquisition and retention decisions (Blattberg and Deighton 1996, Blattberg, Getz, and Thomas 2001), promotion expenditures (Berger and Bechwati 2001, Berger and Nasr 1998), and marketing actions when future brand switching

TABLE 6
Comparisons of CRM Metrics for Customer Selection

Percentage of Cohort (Selected from Top)	CLV	PCR	PCV	CLD
5%				
Gross profit ($)	144,883	71,908	131,735	107,719
Variable costs ($)	1,588	979	950	790
Net profit ($)	143,295	70,929	130,785	106,389
10%				
Gross profit ($)	78,401	27,981	72,686	55,837
Variable costs ($)	1,245	943	794	610
Net profit ($)	77,156	27,038	71,892	55,227
15%				
Gross profit ($)	56,147	15,114	52,591	44,963
Variable costs ($)	807	944	809	738
Net profit ($)	55,340	14,170	51,782	44,225

Notes All metrics are evaluated at 30 months, with an 18-month prediction window Cohort 2 provides similar results The reported values are cell medians Gross profit is residual revenue after removing cost of goods sold In general, for the firm that provided the database, the cost of goods sold is approximately 70%, thus, gross profit = revenue × 3 is considered (Rust, Zeithaml, and Lemon 2004) These guidelines represent a significant step toward incorporation of long-term customer profitability effects into firm-level managerial decision making However, the models provide less insight into decisions about how to manage individual customers in a way that accounts for the heterogeneity, and they do not provide a mechanism for dynamic updating of profitability assessment (Libai, Narayandas, and Humby 2002)

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[5] We also compared the metrics with a censoring time at 18 months and prediction window of 30 months The substantive results of the study hold even for a 30-month prediction window The results are available on request from the authors

Our resource allocation algorithm uses Equation 2 as the objective function, and the purpose of the optimization is to find the level of contacts across various channels with each individual customer that would maximize CLV Equation 2 is a function of predicted purchase frequency (based on Equation 4), predicted contribution margin (based on Equation 5), and marketing costs We first estimated the responsiveness of customers (coefficients, β_s) to marketing contacts from the purchase frequency model and the contribution margin model To design a CLV-based resource allocation strategy, we held the coefficients constant and identified the level of covariates (i e , level of channel contacts) for each customer that would maximize CLV In summary, in Equation 2, the contacts made to a customer across various channels are under the supplier's control and thus can be used to maximize CLV, depending on the cost of each mode of communication and the responsiveness of the customer (in terms of both purchase frequency and contribution margin) to each channel of communication[6] In other words, with respect to marketing resources for a firm, the customer contact levels across different channels appear in the revenue and cost sides of Equation 2 and thus avoid the scope of corner solutions

We used a genetic algorithm to derive the levels of contact desired for each individual customer that maximize CLV Genetic algorithms (Goldberg 1989) are simulation-based, parallel-search algorithms that have been used in econometrics (Dorsey and Mayer 1995, Liang and Wong 2001) to obtain optimal solutions when the complexity of the optimization function tends to be intractable and multidimensional In our study, support for a purchase frequency distribution with two subgroups led us to believe that the optimization surface is multimodal In addition, we intended to allocate resources for each customer on the basis of individual responsiveness These issues made our optimization problem extremely complex and intractable with traditional analytical methods Thus, we resorted to a search algorithm to find the optimal resource allocation levels In addition, the multimodal nature of the optimization surface (given the support for a mixture distribution for purchase frequency) motivated us to use a parallel-search technique, which is not susceptible to local minima (common in multimodal distributions) (Venkatesan, Krishnan, and Kumar 2004) Appendix C explains how we used a parallel-search technique for resource allocation purposes

Aggregate Results

The total net present value of future profits from a resource allocation strategy that maximizes CLV (with the predicted contribution margin) is approximately $44 million We also computed the total net present value of future profits when the organization uses its current resource allocation strategy Specifically, for each customer, we maintained the resource allocation levels for the most recent year and calculated CLV over a three-year period We find that, based on this status quo resource allocation strategy, the total net present value of future profits is approximately $24 million Therefore, we find that a resource allocation strategy that maximizes CLV results in an increase in profits by approximately 83% The total cost of communication (over three years), based on the resource allocation strategy that maximizes CLV, is approximately $1 million The total cost of communication in the organization's current strategy is approximately $716,188 We find that the organization improves profits by increasing costs of serving customers (rather than cost of communication in the previous year) by 48% The return on marketing communication to the organization, based on its current strategy, is approximately $34 million ($24 million/$716,188) With a communication strategy that maximizes CLV, the return on marketing communication to the organization is approximately $44 million ($44 million/$1 million) Thus, it is possible to improve profits and return on marketing communication by appropriately identifying customers for target communications and by matching the channel of communication with customer preferences The aggregate results suggest that given the improvement of approximately $20 million among a sample of 216 customers, there is a potential for the firm to increase its revenue by at least $1 billion across its entire customer base However, such benefits may not be realized immediately because the firm also needs to incur costs to move toward a customer-centric view and to train its employees to manage customers on the basis of CLV

Implications, Limitations, and Further Research

The objective of our study was to analyze the usefulness of CLV as a metric for customer selection and resource allocation strategy First, we developed and estimated an individual customer-level objective function, the goal of which is to measure CLV Second, we demonstrated the superiority of selecting customers for contact on the basis of CLV compared with commonly used metrics such as PCR, PCV, and CLD Third, we evaluated the benefits of designing marketing communications that maximize CLV We now discuss the implications of our study and how managers can use this knowledge to design efficient marketing programs We also provide an outline for future researchers to build on the framework proposed herein

Implications

Antecedents of purchase frequency and contribution margin The theoretical implications of the purchase frequency model are also related to the CUSAMS customer asset management framework (Bolton, Lemon, and Verhoef 2004) In this study, we tested parts of the CUSAMS framework and found empirical support for the parts we tested Specifically, the CUSAMS framework proposes that marketing instruments (e g , direct mailings, reward programs) affect a customer's price perceptions, satisfaction, and commitment In turn, these affect the length, depth, and breadth of a relationship, which then ultimately influence CLV We find empirical support for marketing instruments' effects on purchase frequency (rich and standardized modes of communication and relationship benefits) and contribution margin (total marketing efforts), both of which ultimately influence CLV We also find that breadth of purchases (cross-buying) and depth of buying (upgrading) affect purchase frequency, which ultimately influences CLV In addition, we find support for a nonlinear relationship between supplier communications and purchase frequency This supports Fournier, Dobscha, and Mick's (1997) expectations that too much communication between suppliers and customers can be disruptive Thus, our results indicate that managers need to be cautious when designing marketing communication strategies across different channels and need to be wary of contacting customers too many times, especially through rich modes of communication

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[6] In Equation 2, the level of contacts in each channel for each customer is varied each year However, to simplify our optimization routine, we assumed that the level of contacts is equal across the prediction period Our assumption can be viewed as taking the average level of contacts in the prediction periods

We find an inverted U-shaped relationship between returns and purchase frequency A possible benefit from customers who return products could be the opportunity to understand the reasons for dissatisfaction In addition, customers who return products within a certain period may do so because they have inherent trust in the supplier and because they expect future benefits, such as improvements in the quality of the product However, a customer's returning too many times may indicate erosion of trust with the firm or a lower level of future activity We also find that customers that establish contact through the online channel of communication exhibit high frequency of purchases and have high involvement Therefore, the online channel can provide an ideal setting for B2B firms to enhance their customer relationships We find that in addition to influencing purchase frequency, marketing communications influence the expected contribution margin from a customer Also in the B2B scenario, industry category and size seem to be important factors that influence the magnitude of contribution margin

Enhancement of marketing productivity Rust, Zeithaml, and Lemon (2004) propose that firm strategies and tactical marketing actions affect the marketing productivity chain Our analyses of customer selection investigate how firms can enhance strategies, and our analysis of optimal resource allocation investigates how firms can improve tactical marketing actions

Customer selection A CLV metric better identifies customers that provide higher future profits than do PCR, PCV, and CLD Our analyses indicate that CLV is preferred to incorporate the dynamics of customer purchase behavior into the customer selection process Managers can substantially improve their return on marketing investments by using a dynamic, customer-level measure of CLV for scoring rather than using the other metrics suggested in the literature and by prioritizing contact programs

Resource allocation strategy The results from our study highlight the importance of firms' considering individual customers' responsiveness to marketing communication as well as the costs involved across various channels of communication when making resource allocation decisions Our analyses suggest that there is a potential for substantial improvement in CLV through appropriate design of marketing contacts across various channels When firms design resource allocation rules, they can realize the increase in profits by incorporating the differences in individual customer responsiveness to various channels of communication and the potential value provided by the customer The proposed resource allocation strategy can be a basis for evaluating the potential benefits of CRM implementations in organizations, and it provides accountability for strategies geared toward managing customer assets

To summarize, the major conclusions that we derive from our study are the following

- Marketing communication across various channels affects CLV nonlinearly,
- CLV performs better than other commonly used customer-based metrics for customer selection such as PCR, PCV, and CLD, and
- Managers can improve profits by designing marketing communications that maximize CLV

Limitations and Further Research

The study has limitations that further studies can address The results of this study are from a customer database in the high-technology industry Further studies need to investigate whether the results are generalizable to other industries and settings In addition, further research needs to develop models that combine forecasts of aggregate competitive responses to marketing actions and customer brand switching with individual-level models of direct marketing We also consider only the average levels of optimal communication strategy in a channel However, firms can further improve the efficiency of communication strategy by appropriately sequencing their customer contacts across different channels In addition, in our study, we provide a framework for maximizing CLV with marketing communications However, note that we do not compare our proposed resource allocation strategy (that focuses on maximizing CLV) with a strategy that focuses on allocating resources to customers for which the increment in CLV from appropriate design of marketing communication is highest For example, with an appropriately designed marketing strategy, it is possible that customers that previously had high CLV continue to have high CLV in the future, irrespective of the level of marketing communications, and that some customers that have had low CLV transform to high-CLV customers Further research can investigate whether the customers selected for high levels of marketing communications are the same when the resource allocation strategy focuses on maximizing CLV or on maximizing incremental CLV Finally, the sum of optimal CLVs for each individual customer need not lead to the optimal customer equity in the case of a budget constraint We performed our optimization with a budget constraint, and there were no changes in the substantive results of the study In addition, our optimization algorithm is flexible enough to allow for inclusion of the budget constraint without any substantial adjustments

The customer- and supplier-specific antecedents used in the customer response model also can directly affect costs and thus margins However, because we estimated the customer response model in a single step, which we then included in a net present value function (Equation 1) that includes both costs and margins, we assessed the indirect effect of the covariates on both costs and margins Further studies can develop and test hypotheses that directly relate CRM efforts to costs and margins In addition, it can be expected that margins change over time In this case, the value that a customer provides to a firm is a function of both the expected time frame until the next purchase and the contribution margin at that particular period We treated several antecedents used in our framework (e g , upgrading, cross-buying, bidirectional communication, number of returns, number of Web-based contacts) as exogenous variables in our analysis We used the lagged variables of these to account for potential endogeneity Further research can investigate more sophisticated techniques that explicitly treat these variables as endogenous Finally, a notable issue that arises from our analyses is whether the recommendations from an optimization framework pan out when implemented in the real market Although our study is a step in the right direction to assess the accountability of marketing actions, a field experiment that tests the recommendations of such a framework on a test group against a control group that is managed according to existing norms would provide a stronger justification for CRM-based efforts

Appendix A
Results from Data Analyses

Purchase Frequency Model

Model estimation For Cohorts 1 and 2, the results are based on 50,000 samples of the MCMC algorithm (for details of the algorithm, see Allenby, Leone, and Jen 1999, Appendix) We simulated the posterior distribution using five parallel chains with overdispersed starting values In each chain, we used the initial 40,000 iterations as burn-in and used the last 10,000 iterations to obtain posterior statistics We used "slice-sampling" (Neal 2000) to obtain random samples We assessed the autocorrelations of the posterior samples to perform thinning The autocorrelation functions revealed that every fifth sample is unrelated to every other fifth sample Thus, the posterior statistics are based on 2000 samples (using every fifth sample from 10,000 samples) We assessed the convergence of the algorithm from the line plots of the posterior sample and by evaluating Gelman and Rubin's (1992) $\sqrt{\hat{R}}$ statistic Values of $\sqrt{\hat{R}}$ that are closer to 1 reveal that all the chains have converged to true posterior distribution In our analyses, we found that the value of $\sqrt{\hat{R}}$ ranged from 1 2 to 9 (in previous research [Cowles and Carlin 1996], these values have been found to indicate convergence of the MCMC chains) Our approach to investigating within-chain autocorrelations, computing Gelman and Rubin's statistic, and visually inspecting the sampling plots has been recommended widely for convergence diagnostics (Cowles and Carlin 1996) We implemented the estimation algorithm using the GAUSS software package, and we performed the convergence diagnostics using CODA We also used multiple prior values for the estimates and did not find a significant impact on the posterior samples, this is because we used diffuse prior values and because of the large sample size of our data set

Model selection Table 4 shows that a simple generalized gamma model without the probit link function or time-varying covariates (Model 1) provides a log-likelihood of –3298 91 (we calculated the log-likelihood using Newton and Raferty's [1994] log marginal density measure) A generalized gamma model with the probit link function (two subgroups) but no time-varying covariates (Model 2) provides a log-likelihood of –2908 66 Finally, the log-likelihood for the generalized gamma model with the probit link function (with two subgroups) and time-varying covariates (Model 3) is –2237 82 Increasing the number of subgroups in Models 2 or 3 did not result in significantly higher log-likelihoods We also computed the AIC and BIC for model selection For both measures, a higher value indicates a better model We find that Model 3 has the highest value for both AIC and BIC (AIC = –4484 for Model 3, –5825 for Model 2, and –6606 for Model 1, BIC = –4683 for Model 3, –5910 for Model 2, and –6639 for Model 1) In addition, a latent-class finite mixture model with two segments provides a likelihood of –2938 Overall, the results show that the generalized gamma model with two subgroups provides a good fit to the data

Distribution parameters The values of γ in the generalized gamma model are γ_1 = 1 2 and γ_2 = 9 for Subgroups 1 and 2, respectively The component masses for Subgroup 1 (φ_1) and Subgroup 2 (φ_2) are 54 and 46, respectively All the distribution parameters (α_k, ν_k, and θ_k) have more than 99% of their samples different from zero The mean expected interpurchase time for Subgroup 1 is 4 2 purchases in a year, and the mean expected frequency for Subgroup 2 is 1 01 purchases in a year Given the variation in expected frequencies in each subgroup, we term Subgroup 1 the "active state" and Subgroup 2 the "inactive state "

Influence of antecedents and covariates Our empirical analyses support all the proposed effects of the antecedents on purchase frequency

Out-of-sample forecasting accuracy We used relative absolute error (RAE) to evaluate the forecasting accuracy of the generalized gamma model compared with that of a naive moving average model (the moving average model is implemented as an updated average of every consecutive interpurchase time for a customer) We used all but the last observation for each customer (calibration sample) to estimate the parameters of each model We then used the mean posterior values to compute the expected time until next purchase from Equation 3 We then compared the forecast time until the next purchase with the holdout sample (formed from the last observation for each customer) to assess the mean absolute deviation (MAD) The RAE is given by the ratio of the model MAD to the MAD based on the moving average measure Based on the RAE measure, the generalized gamma model with time-varying covariates (Model 3) has an RAE of 51, compared with that of a naive moving average technique The MAD from Model 3 is 5 21 months, compared with 10 24 months for the moving average measure Model 3 provides the best improvement in forecasting accuracy compared with Model 2 (RAE = 84) and Model 1(RAE = 95) We also assessed the predictive capability of the purchase frequency model using hit rate In other words, we assessed the number of purchases in the holdout sample that the model also correctly predicted as a purchase We observe that among customers who bought within 12 months, the model currently identifies 89% of them, and among customers who did not buy within 12 months, the model currently identifies 90% of them

Contribution Margin Model

Estimation and influence of antecedents and covariates We estimated the contribution margin model on annual data from 1997 (t – 4) to 2000 (t) for Cohort 1 and from 1998 to 2000 for Cohort 2 The revenue in 2001 (t + 1) is a holdout sample for Cohorts 1 and 2 The coefficients of the contribution margin model are provided in Table 5 The contribution margin model provides an adjusted R^2 of 68 Overall, the results of the analyses support all the hypothesized relationships

Out-of-sample forecasting accuracy As with typical time-series models, we advanced the independent variables by one period to forecast the dependent variable in period t + 1 Specifically, when the contribution margin model is used to predict period t + 3, the contribution margin in period t + 1 is an independent variable and is obtained from the prediction in period t + 1 The contribution margin model predicts the growth in revenue from period t to t + 1 We obtained the magnitude of revenue in period t + 1 by adding the predicted value from the contribution margin model to the base revenue in period t We evaluated the performance of the contribution margin model in the holdout sample on the basis of our estimates from the calibration sample Table A1 provides the descriptive statistics of the observed contribution margin and the predicted contribution margin in the holdout sample (period t + 1) In the holdout sample, the mean predicted contribution margin in period t + 1 is approximately $67,729, and the mean observed contribution margin is approximately $64,396

Appendix B
Description of Customer Selection Metrics

CLV

We entered predictions from the purchase frequency (Equation 3) and contribution margin (Equation 4) models into Equation 2 to obtain the net present value of future profits (period t + 1) from each customer The purchase frequency model predicts the expected time in months until next purchase for each customer We assigned a 30% margin after accounting for cost of goods sold (the managers who provided the database informed us that 30% was a nominal margin for most of their products), and we computed the variable costs using costs of communication The mean unit cost of standardized modes of communication is approximately $3, and the mean unit cost of rich modes of communication is $60 We computed the unit cost of communication for each customer as the ratio of the total contacts for a given channel in a given year to the total cost of contact for a given mode in a given year Finally, we used an annual discount rate of 15% for each customer, which is based on the lending rate that is appropriate for the time of the study

PCR and PCV

We define PCR as the revenue provided by the customer in the most recent observed purchase We define PCV as the cumulative profits obtained from a customer until the current period The cumulative profits are calculated annually from a customer's initiation until the current period We projected the profit in each year to current terms using a discount factor The PCV calculation is as follows

$$\text{(B1)} \qquad PCV_i = \sum_{t=0}^{T} \left(CM_{it} - MC_{it}\right) \times (1 + r)^{T-t},$$

where $CM_{i,t}$ is the contribution margin for customer i in period t, $MC_{i,t}$ denotes marketing costs for customer i in period t, t is an index for time period (t = 0 for the period of customer initiation, for example, t = 0 for 1997 for Cohort 1 customers, and t = 0 for 1998 for Cohort 2 customers), T is

TABLE A1
Comparison of Descriptive Statistics Between Observed Contribution Margin and Predicted Contribution Margin in the Holdout Sample

	Mean	Standard Deviation	Minimum	Maximum
Observed	50,199	23,850	–171	1,010,881
	(49,229)	(24,836)	(–181)	(1,420,981)
Predicted	57,729	24,538	–178	1,897,257
	(74,283)	(22,598)	(–159)	(1,938,458)

Notes All reported values are in dollars and are rounded to the nearest integer Values in parentheses represent Cohort 2 the current period, and r is the discount rate, which we set at 15%

CLD

In our analysis, we evaluated the probability that a customer is alive or dead in the planning window using the P(Alive) measure that Schmittlein and Peterson (1987) and Reinartz and Kumar (2002) recommend The P(Alive) measure uses the previous purchase pattern to predict the probability that a customer is still alive at each period in the prediction window Higher values of P(Alive) indicate longer lifetime duration

Appendix C
Genetic Algorithms to Develop Resource Allocation Strategies

Researchers in marketing have only recently begun to recognize the potential benefits of using genetic algorithms (Balakrishnan and Jacob 1996, Midley, Marks, and Cooper 1997, Naik, Mantrala, and Sawyer 1998, Venkatesan, Krishnan, and Kumar 2004) in deriving optimal strategies for complex marketing problems The genetic algorithm proceeds by searching for the optimal level of contact for each customer that maximizes CLV The sum of the optimal CLVs from each individual customer provides the optimal customer equity of the analysis sample[7] Specifically, we varied the contact levels for each customer and then calculated the sum of CLV of all customers in the sample Our objective was to calculate the maximum value for this sum of the CLVs In this case, our optimization algorithm maximized the objective function by varying 432 parameters in Cohort 1 (216 customers and 2 parameters for each customer [levels of rich and standardized modes]) Following research in customer equity (Rust, Zeithaml, and Lemon 2004), we set the time frame for our optimization framework as three years Our database provides information on the approximate unit cost of communication through rich modes and standardized modes to each customer On average, the unit marketing cost through standardized modes (average of direct mail and telephone sales) is $3, and the unit marketing cost through rich modes (salesperson contacts) is $60 Thus, the cost of communication through rich modes is approximately 20 times the cost of communication through standardized modes Such a cost index is commonly encountered We set the parameters in the genetic algorithm as follows population size = 200, probability of crossover = 8, probability of mutation = 25, and convergence criteria = difference in solution in the last 10,000 iterations should be less than 01% We ran the genetic algorithm at least 50 times and used the mean of the resource levels corresponding to the maximum CLV from each run as the resource reallocation rule for each customer

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[7] When forecasting contribution margin for three years ahead, note that we have data on marketing activities from 1997 to 2001 Our last prediction for the long-term analysis is in period 2003, for which we need marketing variables in 2002, which we do not have For forecasting the contribution margin in 2003, we used the average of marketing-mix variables from 1997 to 2001 for imputing the values in 2002 However, for the optimization phase, the optimized marketing-mix variables are substituted for the 2002 values We thank a reviewer for bringing this to our attention

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How Is Manifest Branding Strategy Related to the Intangible Value of a Corporation?

Firms exhibit or "manifest" three types of branding strategies corporate branding, house of brands, or mixed branding These strategies differ in their essential structure and in their potential costs and benefits to the firm Prior research has failed to understand how these branding strategies are related to the intangible value of the firm The authors investigate this relationship using five-year data for a sample of 113 U S firms They find that corporate branding strategy is associated with higher values of Tobin's q, and mixed branding strategy is associated with lower values of Tobin's q, after controlling for the effects of several important and relevant factors The relationships of the control variables are consistent with prior expectations In addition, most of the firms would have been able to improve their Tobin's q had they adopted a branding strategy different from the one their brand portfolios revealed The authors also discuss implications and future research directions

Over the past decade, there has been significant interest among academics and practitioners in understanding the importance of brand equity Highly competitive markets make powerful brands essential to accomplishing growth According to Aaker (1991), firms create brand equity by delivering quality products and by creating strong brand associations through appropriate communication and advertising strategies[1] Brands have been widely acknowledged as having a financial value because they are able to generate future cash flows (Aaker and Jacobson 1994) The enhanced cash flows are based on, among other things, customer loyalty, high margins, brand extension and licensing opportunities, and increased marketing efficiency of strong brands (Keller 2002, p 46) In recognition of the long-term financial contribution of brand equity, financial markets seem to consider brands in their stock valuations (Barth et al 1998, Simon and Sullivan 1993) Extensive research has been conducted on the estimation of brands' financial value and measurement techniques, as well as on brand extensions (Haigh 1998, Keller and Aaker 1992, Murphy 1989, Reddy, Holak, and Bhat 1994) An intense discussion about the admission of brands in financial accounts is ongoing in the accounting community (Barth et al 1998, Kallapur and Kwan 2004, Lev and Sougiannis 1996) However, there is no debate that brands are intangible assets of a firm (Lev 2001)

Firms can follow several branding strategies to manage their brands In general, most firms begin with a single product and become multiproduct firms over time In such cases, there is a brand name for the first product that most likely is related to the name of the corporation, which marketers refer to as corporate branding As new products are added, the managers of the firm have the option to use the firm identification in the brand name and to continue the corporate branding strategy If the initial brand name did not use the firm name and if the firm chooses different names for each new product (without the firm name), this is known as a "house-of-brands" strategy However, if a firm acquires another firm (or a division of another firm), the products of the acquired firm will have brand names in place, in this situation, the branding strategy of the new entity is a mixed branding strategy Mixed branding also occurs if a firm uses corporate names for some of its products and individual names for others In general, the type of branding strategy can be inferred from examination of all the brand names of a firm's products, we refer to this as "manifest" branding strategy and only occasionally use that adjective herein More important, the manifest strategy is a result not necessarily of deliberate brand decision making but of other decisions that the firm may have made

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[1] Firms frequently use the equity of their current brands to introduce brand extensions These brand extensions are successful when the parent brand is viewed as having favorable associations and when there is a perceptual fit between the parent brand and the extension product (Keller 1998, p 473) In efforts to understand the creation and effective use of brand equity, several techniques to measure brand equity have been suggested by consulting, advertising, and investment firms, as well as by the academic community (Agarwal and Rao 1996, Kamakura and Russell 1993, Simon and Sullivan 1993, Swait et al 1993)

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Whenever a firm is about to launch a new product or acquire a firm, it needs to make a strategic decision as to which type of branding strategy (corporate, house of brands, or mixed) it should adopt to maximize its intangible value The intangible value it creates will affect how the financial market will view the firm Despite extensive research on branding in the marketing literature, there is no available guidance for firms' management because of a lack of systematic research on the financial effects of types of branding strategies This article is an attempt to fill this gap in the literature Our work addresses the issue of how a firm's products are branded and how branding strategy is related to the firm's intangible value

The three branding strategies can be plotted on a continuum At one end is corporate branding, which entails strategies that use solely the corporate name on products At the other end is house of brands, which describes strategies that use individual brand names (with no corporate identification) The stock markets presumably value firms differently and impute different brand equity potential for each particular type of branding strategy For example, corporate branding may be viewed as having higher equity because the firm can build and leverage its overall reputation, whereas a house-of-brands strategy, by definition, requires a firm to build the reputation of each of its individual brands

In general, advertising expenditures affect the financial markets (Chauvin and Hirschey 1993, Cheng and Chen 1997) The advertising expenditures depend on the branding strategy that the firms follow, corporate branding usually requires fewer expenditures than the house-of-brands strategy Although a change in advertising expenditures is related to a change in the stock price (Cheng and Chen 1997), is the impact of a change different for different branding strategies? This is an unanswered question

Despite extensive research on branding in the marketing literature, examination of the relationship between branding strategies and firm value is nonexistent This article is an attempt to fill this gap For our research, we classify companies' manifest branding strategies and combine the data with financial data to investigate the relationship between manifest branding strategies and firm financial performance Our overall objective is to assess the effectiveness of the three main branding strategies on the intangible value of a firm We believe that our results may also provide guidance for firms in choosing their branding strategies, if they have the opportunity to do so, and in formulating their merger and acquisition decisions

Against this background, our study seeks to answer two questions (1) How are different manifest branding strategies related to the intangible value of a firm? and (2) Do advertising expenditures interact with the relationship between the intangible value of a firm and the type of its manifest branding strategy?

The remainder of this article is organized into five sections The next section provides a review of the literature that pertains to branding strategies and the relevant financial and accounting research on the financial valuation of a firm The subsequent section describes our model, which relates intangible assets to other descriptors of the firm, including branding strategy and our method of estimating the model It also describes ways to measure the intangible value of a firm and other commonly used correlates of the intangible part of firm value The next section describes the data collection method and provides a description of our data We then describe and interpret our results, and we conclude by offering some directions for further research

Literature Review

Branding Strategies

The literature contains several taxonomies for classifying branding strategies, the most important are those of Olins (1989), Murphy (1987, 1989), and Laforet and Saunders (1994) Olins uses a three-category scheme of corporate identities only, corporate name with a subsidiary name, and branded identities Murphy suggests four categories of corporate-dominant, brand-dominant, balanced systems, and mixed systems Finally, on the basis of a comprehensive content analysis of brands of major U S and European grocery products, Laforet and Saunders propose three categories of brands (all based on the use of the corporation's name in products' brand names) Their categories are as follows (1) The name of the corporation or its subsidiary is prominent in the brand names of the products or services (e g , FedEx), (2) the corporation's name is combined with another name (e g , Kellogg's Corn Flakes), and (3) the corporation's name is not used at all to mark products or services (e g , Pampers)

We adopt a three-category taxonomy based on Laforet and Saunders's (1994) scheme—corporate branding, house of brands, and mixed branding—which we subsequently describe We provide examples in Table 1

> *Corporate branding* With the corporate branding strategy, the corporate name is dominant in endorsing all or part of the firm's product and service brands At the least, the corporate name is an element of the product brand names This holds throughout all its subsidiaries and at all company levels Examples of companies that employ this strategy are Hewlett-Packard, McDonald's, and FedEx
>
> *Mixed branding* In a mixed branding strategy, firms typically employ a set of house or family brands, such as subsidiary names, in their brand portfolio, in addition to using the corporate name for certain products Brands with names other than the firm's name are typically strong and significant to the firm For example, apart from Pepsi's flagship brand, it operates with the Mountain Dew and Aquafina brands, and its subsidiaries Tropicana and Frito-Lay use individual brands at the product level (e g , Doritos, Ruffles)
>
> *House of brands* In the house-of-brands strategy, the firm does not use its corporate name or the name of its subsidiaries for branding its products Instead, it uses individual brand names to market its products Companies such as Unilever, ConAgra, and Diageo keep their corporate name in the background and use individual brands for their product lines Examples are brands such as Dove and Lipton marketed by Unilever and Pampers and Crest marketed by Procter & Gamble

TABLE 1
Examples of Manifest Branding Strategies

Branding Strategy 1 (Corporate Branding)	Branding Strategy 2 (Mixed Branding)		Branding Strategy 3 (House of Brands)	
Company and Brand	**Company**	**Selected Brands**	**Company**	**Selected Brands**
Nike	Gillette	Gillette, Oral-B, Duracell, Braun, Waterman	Procter & Gamble	Pampers, Crest, Ariel, Tide, Bounty, Always, Febreze
AT&T	The Gap	The Gap, Banana Republic, Old Navy	Darden Restaurants	Red Lobster, Olive Garden, Bahama Breeze
Dell Computer	3M	3M, Scotch, Thinsulate, Scotchgard	Bristol-Myers Squibb	Clairol, Aussie, Herbal Essences, Viactiv, Boost

Notes: The examples are based on information from the companies as of April 2000.

The three branding strategies are associated with different benefits and shortcomings, which arise from both the supply and the demand sides (for our summary, see Table 2). In general, enhanced cash flows and lower risks are positively associated with the advantages and negatively associated with the disadvantages of the branding strategies.

For the corporate branding strategy, the major advantages are economies of scale in marketing and efficiency in creating brand equity, which can help lower per-item promotion costs. Although this strategy can help brand extensions, there is a risk of dilution or loss of brand identity if a firm overstretches a brand name to product categories that do not match the brand's established associations; therefore, it may limit a firm's ability to expand into some unrelated categories. Under this strategy, the total marketing budget across the portfolio of all products can be lower because of the spillover effects among the products with the same brand name and because consumers are likely to transfer their loyalty between products that carry the same brand name. A corporate brand name is an efficient means to communicate with a firm's stakeholders other than customers (e.g., shareholders, retailers, employees) to build public relations and investor relations.

In contrast, the house-of-brands strategy offers significant possibilities for creating distinctly positioned brands that convey the personality of a firm's products by means of physical or perceptual benefits. Furthermore, each brand creates its own brand equity. By using multiple brands rather than one corporate brand to market different products, a firm can usually command more total shelf space

TABLE 2
Supply- and Demand-Side Advantages and Disadvantages of Different Branding Strategies

Branding Strategy	Supply-Side Advantages (+) and Disadvantages (–)	Demand-Side Advantages (+) and Disadvantages (–)
Corporate branding	Economies of scale in marketing (+) Total costs of advertising/promotion can be lower (+) Lower costs of creating brand equity (+) Lower costs of new product introductions (+)	Easier extension of brands (+) Limits on firm's ability to expand into some categories (–) Higher cannibalization among firm's brands likely (–) Efficient means to communicate to various stakeholders (+)
House of brands	No identifiable economies of scale in marketing (–) Higher costs of advertising (–) Can command larger retail shelf space (+) Significantly higher costs of new product introductions (–)	Distinctly customized brands can be offered (+) Lower cannibalization (+)
Mixed branding	Combination of advantages and disadvantages of corporate branding and house of brands	Combination of advantages and disadvantages of corporate branding and house of brands

with retailers, which leaves less shelf space for competitors. However, this strategy is quite costly for the firm in building brands and in introducing new products.

The mixed branding strategy can provide both the benefits of the corporate brand strategy and the possibility to create separate product-class associations for various brands of the firm. Both the mixed branding and the house-of-brands strategies can help prevent cannibalization if a firm wants to operate with more than one brand in the same market. Multiple brands enable the firm to serve different market segments better by customizing offers more precisely to the target segment's needs. Therefore, multiple brands are useful if a firm markets products targeted at different segments.

Brands and Financial Value of a Firm

Some studies in finance and accounting examine the connections between brand values and a firm's financial performance. For example, using two cross-sectional regression models, Barth and colleagues (1998) find that brand value estimates of *Financial World*'s annual brand evaluation survey are significantly and positively related to stock prices and returns and that brand value estimates represent valuation-relevant information beyond advertising expenses, operating margin, market share, and earnings forecasts.

Kallapur and Kwan (2004) also show the value relevance of brand assets, they estimate a regression model for the market value of equity on cross-sectional data, using the book value of nonbrand assets, net income, and brand assets (as disclosed in the firms' financial statements) as explanatory variables. The highly significant coefficient of the brand asset variable indicates that brand asset values constitute valuation-relevant information for the stock markets.

There is some related research in the marketing area that relates firms' security prices and returns to brand attributes as predictor variables. For example, Simon and Sullivan (1993) report superior brand equity estimates for industries and firms with well-known brand names. Aaker and Jacobson (1994) use stock returns as a response variable to examine the impact of perceived quality measures. Their models include a quality measure (using the EquiTrend Survey by the Total Research Corporation) and an array of other control variables, such as return on investment, brand awareness, advertising expenditure, and time. Their analysis indicates that stock returns are positively associated with perceived brand quality.

Security price reactions also are examined in two event studies that incorporate news on major decisions on brand strategy as events. Horsky and Swyngedouw (1987) find that company name changes have a positive impact with respect to a firm's return on assets. Likewise, Lane and Jacobson (1995) find that the stock market returns to brand extension announcements depend interactively on brand attitude and brand familiarity.

Complementing the academic research on the recognition of brands' financial value in security prices are the large premiums paid in mergers and acquisitions, representing goodwill, which are largely subscribed to the transferred brands (Buchan and Brown 1989).

In summary, the extant research indicates that brands have a financial value. In addition, brand values are not fully accounted for in the book values of the firm. However, there is no research on the ways different branding strategies are related to the financial value of a corporation.

A Framework and Model to Evaluate the Effects of Branding Strategy

Conceptual Framework

The value of a firm, which consists of both tangible and intangible assets, represents the collective future cash flows to the firm's equity investors and bondholders, discounted at an appropriate rate. These cash flows are generated by the firm's investment, financing, and dividend decisions (Damodaran 2001). The cash flows and their risk are affected in part by the management of market-based assets, such as customer and partner relationships (Srivastava, Shervani, and Fahey 1998). Brands and brand equity represent the relationship between the firm and its customers and can affect firm value by accelerating and enhancing cash flows or by reducing risk. For example, corporate brands make it easier for a firm to introduce brand extensions and can enhance cash flows as a result of lower costs of promotions and cobranding. Strong brands can also reduce a firm's vulnerability to competition and, in turn, reduce the risk of the future cash flows. Thus, the branding strategies of a firm create long-term brand equity through the customer responses they engender.[2] In general, this value is not measured in the tangible assets of the firm, it becomes part of the intangible assets of a firm.

The intangible assets of the firm are affected by several firm-specific factors in addition to branding strategy. Some factors reflect the previous operations of the firm, and others reflect future growth opportunities, investors can use both types of factors to assess future cash flows and their risk. Variables such as age of firm, operating margin, leverage, advertising expenditures, and focus all reflect the firm's previous operations. Similarly, factors that affect future growth include research and development (R&D) expenditures, acquisitions, industry characteristics, and competition. Our analysis controls for these other variables while determining the relationship of branding strategy and intangible value. In the next section, we describe their operationalization and linkage to the intangible value of a firm.

We use Tobin's q ratio to measure the intangible assets. Tobin's q is the ratio of the market value of the firm to the replacement cost of the firm's assets. It is a forward-looking measure, providing market-based views of investor expectations of the firm's future profit potential. The long-term equilibrium market value of a firm must be equal to the replacement value of the firm A q-value of greater than 1 0 reflects an unmeasured source of value attributed to the intangible assets Beginning with the work of Lindenberg and Ross (1981), the empirical finance literature has used Tobin's q to study many phenomena (e g , barriers and concentration [Chen, Hite, and Cheng 1989], equity ownership [McConnell and Servaes 1990], managerial performance [Lang, Stulz, and Walking 1989], dividend announcements [Lang and Litzenberger 1989]) In marketing studies, Simon and Sullivan (1993) use Tobin's q to measure brand equity, and Day and Fahey (1988) recommend it to measure the value of marketing strategies Bharadwaj, Bharadwaj, and Konsynski (1999) use Tobin's q to analyze the effects of information technology on a firm's performance

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[2] In a conceptual piece, Ambler and colleagues (2002) posit a brand value chain, which connects a firm's activities by marketing management to shareholder value. Their framework consists of several multipliers to marketing program investment to yield the shareholder value (including intangible assets). Such a detailed analysis requires a significant amount of data for operationalization. Our interest is to analyze the effect of one aspect of the marketing program (branding strategy) at a much-aggregated level.

Hypotheses on the Effects of Branding Strategies

Our prior discussion on the three branding strategies (see Table 2) leads us to three hypotheses

> H_1 The corporate branding strategy is associated with higher values of Tobin's q

Given that Tobin's q is based on the reaction of the financial market, H_1 is justified because of the supply-side advantages of a corporate branding strategy (e g , lower costs of advertising, new product introduction, economies of production to enhance future cash flows) Furthermore, the demand-side advantages also reinforce this justification The disadvantages, if any, are not dominant enough to make this effect negative

> H_2 The house-of-brands strategy is associated with lower values of Tobin's q

H_2 is essentially the converse of H_1 According to H_2, a firm incurs much higher costs of advertising its portfolio of brands and incurs enormous costs for introducing new products Furthermore, we conjecture that financial markets pay limited attention to the demand-side advantages of unique positioning and minimal cannibalization The market finds it difficult to keep track of the idiosyncratic strategies of individual brands and tends to value the firm less because of the lower perceived future cash flows

> H_3 Advertising expenditure interacts with the relationship between branding strategy and Tobin's q

A specific expenditure on advertising is more effective under the corporate branding strategy than the house-of-brands strategy because of the scale economies obtained under the former Furthermore, any announcement of such expenditure by a firm that follows the corporate branding strategy becomes much more visible to the financial market Thus, there is a much greater effect, leading to an interaction effect

The calculations for Tobin's q used by Lindenberg and Ross (1981) are quite cumbersome To make the estimation of Tobin's q easier, Chung and Pruitt (1994) suggest a simpler formula [3] They then compare their measure with that of Lindenberg and Ross and show that the fit between the two measures over ten years of cross-sectional data is extremely high, with an R^2 that ranges between 97 and 99 We use the following simpler formula

$$\text{(1)} \qquad \text{Tobin's q} = (\text{MVE} + \text{PS} + \text{DEBT})/\text{TA},$$

where

MVE = (share price) × (number of common stock outstanding),
PS = liquidating value of the firm's preferred stock,
DEBT = (short-term liabilities – short-term assets) + book value of long-term debt, and
TA = book value of total assets

The numerator in Equation 1 represents the total value of the firm and the collective cash flows to the firm's equity investors and bondholders The denominator is the replacement cost of the assets, which is assumed to equal the book value The higher the Tobin's q, the higher is the value of the intangible assets of the firm We use the year-end data taken directly from the annual COMPUSTAT files to compute Tobin's q Our model for the relationship of branding strategy and Tobin's q is

$$\text{(2)} \qquad \text{Tobin's q} = \text{f (branding strategy, control variables)}$$

Control Variables

We include the following control variables in our model to estimate the net effects of branding strategy on Tobin's q (1) focus, (2) concentration index, (3) operating margin, (4) leverage of the firm, (5) R&D expenditures, (6) advertising expenditures, (7) age of firm, (8) number of acquisitions, and (9) growth rate [4] Our selection is based on the discussion in the previous section and on the existing empirical evidence of these variables' relationship to firms' intangible assets (e g , Chauvin and Hirschey 1993, Hirschey and Weygandt 1985, Lustgarten and Thomadakis 1987, Simon and Sullivan 1993) A subset of these variables (e g , advertising expenditures, R&D expenditures, concentration) also appears as a determinant of profitability in extensive meta-analyses studies (Capon, Farley, and Hoenig 1990, Szymanski, Bharadwaj, and Varadarajan 1993) The selection of these variables is also partly influenced by the availability of data A framework for our analysis described in Figure 1 shows the variables we used as controls before teasing out the relationship between branding strategies and Tobin's q All variables reflect previous operations, and some (e g , R&D expenditures) are more directly linked with the growth potential of future cash flows and their risk We fur-

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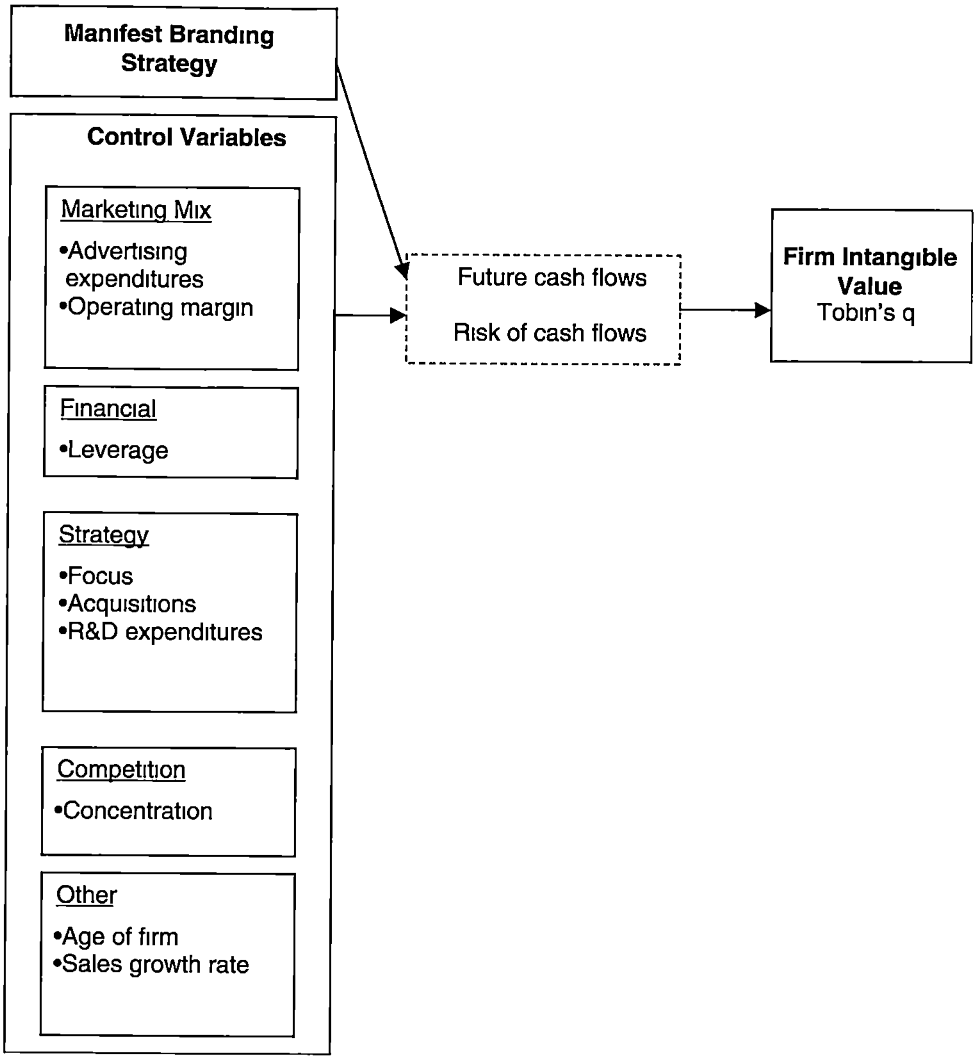
[3] Chung and Pruitt's (1994) formula differs from that of Lindenberg and Ross (1981) in that it assumes that the replacement values of a firm's plant, equipment, and inventories are equal to its book value There is also a slight difference in the way the market value of the firm's long-term debt is calculated Both methods assume that market and book values for short-term debt are identical

[4] A company's reputation has been acknowledged to affect its performance (*Fortune* 2000) Using an annual survey among 10,000 executives, directors, and analysts, *Fortune* measures the reputation of the largest U S companies on a ten-point scale that uses the criteria of quality of management, quality of products/services, innovativeness, long-term investment value, financial soundness, employee talent, social responsibility, and use of corporate assets We could not use these data because they were not available for the study period for all the companies in our sample

Figure 1
A Framework for Our Analysis



ther categorize the variables into ones related to the marketing mix, finances, strategy, competition, and other aspects

Operating margin In general, a higher operating margin triggers expectations among investors of higher cash flow potential and drives intangible value Furthermore, there is evidence that higher brand values are significantly associated with higher operating margins and advertising expenses (Barth et al 1998) Thus, we expect that Tobin's q is positively affected by the firm's operating margins The relevant data are from COMPUSTAT We calculate operating margin as the ratio of net income before depreciation to sales

Leverage Leverage has been used in several corporate finance studies (Berger and Ofek 1995, Denis and Kruse 2000) We use the ratio of long-term debt to total assets of the firm as a measure of leverage Firms with higher leverage can enjoy a tax benefit because they can deduct the interest costs, which results in greater cash flow and thus a positive relationship with Tobin's q McConnell and Servaes (1990) find such a positive relationship However, Smith and Watts (1992) expect that firms with higher growth opportunities (and thus a higher q-value) have lower leverage Thus, we do not have any a priori expectation of the sign of the leverage coefficient

Focus of the firm We measure firm focus by the number of industry segments in which the firm operates, on the basis of information provided by COMPUSTAT Comment and Jarrel (1995) find that at more diversified firms (or firms with lower focus), the asset turnover is higher, and thus asset values are closer to market value, which results in a lower q-value and a positive coefficient In previous studies, this coefficient has been found to have a positive effect in some and a negative effect in others (Lustgarten and Thomadakis 1987), thus, we have no a priori expectation of the sign

Concentration index To capture some effects of competition, we use an index to measure the concentration of the primary industry business in which the firm operates, on the basis of its four-digit North American Industry Classification System codes For this purpose, we compute the

Herfindahl index as a measure of concentration The actual measure is $\Sigma_{i=1}^{I_{c(r)}} m_i^2$, where m_i is the revenue share of the ith company in the primary industry of the rth firm with $I_{c(r)}$ competitors Because higher concentration can provide more market power, it can lead to a higher q-value (Domowitz, Hubbard, and Peterson 1986) Others contend that a higher q-value reflects better efficiency rather than market power (Smirlock, Gilligan, and Marshall 1984) On the basis of recent empirical support , we expect that the effect of the concentration index on Tobin's q is negative (Bharadwaj, Bharadwaj, and Konsynski 1999, Montgomery and Wernerfelt 1988)

R&D expenditures Several studies support the premise that R&D expenditures affect a company's market valuation (e g , Chauvin and Hirschey 1993, Chen, Hite, and Cheng 1989, Kim and Lyn 1990) Lev and Sougiannis (1996) show that investors take R&D information into account when making investment decisions We expect that R&D expenditures have a positive impact on the firm's intangible value, thereby reflecting better prospects for the firm to generate cash flows The R&D data we employ are from the COMPUSTAT file Because companies are not legally obligated to disclose R&D data, much data are missing This lack of data is a reason we ended up with a small sample Our operational measure of R&D expenditures is the ratio of R&D expenditures to total assets of the firm

Advertising expenditures Advertising expenditures are commonly expected to have a positive impact on a company's performance Several studies have supported this notion (e g , Chauvin and Hirschey 1993, Chen, Hite, and Cheng 1989, Klock and Megna 2000) A part of the ample literature on the effectiveness and efficiency of advertising scrutinizes this relationship from a performance viewpoint (for the relationship between brand equity and advertising, see Aaker 1993) In addition, because the advertising expenditures are typically written off in the period they are spent but have a long-term effect on brand equity, they are valued as part of the firm's intangible assets Some studies uncover that higher advertising expenditures are associated with better corporate performance We accordingly expect that the advertising variable has a positive impact on Tobin's q

We collected the advertising data from the publications by Competitive Media Reporting (2001) for the years 1996–2000 Operationally, we use the ratio of advertising expenditures to total assets in our models

Age of firm When a firm has been in business for an extended period, investors have extensive information about the firm and thus value firms closer to their true potential Despite the more accurate evaluation, the intangible value can still be high, with age, the intangible value of brands is actually likely to grow because of advertising, awareness, and loyalty, all of which result in a positive coefficient However, 1996 to 2000 was characterized by a large speculative element for the newer Internet-based firms, which resulted in a high value of Tobin's q Thus, we expect that the age of the firm has a negative impact on Tobin's q We obtained data on how long a firm has been in business from the electronic source Gale Group Business and Company Resource Center (Gale Group 2000)

Acquisitions The financial market is influenced by a firm's acquisitions, which reflect greater growth opportunities in the future We simply counted the number of acquisitions during the preceding year In most cases, this variable is either one or zero If acquisitions are priced at book value, Tobin's q should not be affected However, the stock market typically evaluates acquisitions negatively, in part because of the difficulty of efficiently merging operations Andrade, Mitchell, and Stafford (2001) show that of 3688 mergers between 1973 and 1998, the target firm gained 23 8% in the window beginning 20 days before acquisition announcement and ending on the close, and the acquiring firms lost 3 8% over the same interval On the basis of this evidence, we expect that acquisitions have a negative impact on Tobin's q

Growth rate A higher previous growth rate indicates higher future growth prospects and thus results in a higher value of Tobin's q Our measure of growth is the compounded annual sales growth rate over the previous three years (e g , Barth et al 1998) We expect that this variable has a positive impact on Tobin's q

The relationship between our hypotheses and the control variables of our model are summarized in Table 3

Estimating Branding Strategy Effects

We estimate the relationship of branding strategy with the firm value (as measured by Tobin's q) while controlling for advertising expenses and other variables noted previously We employ two variants of a regression-like model Our first model, M1, is a standard ordinary least squares (OLS) model, which assumes that the regression coefficients are the same for all firms and industries Our second model, M2, allows for different firm-specific regression coefficients, we estimated this model using hierarchical Bayesian regression methods

Aggregate Estimates

Our basic model at the aggregate level (M1) is

$$
\begin{aligned}
(3)\quad Y_{rt} &= \text{Tobin's q for firm r at time t} = \beta_0 \\
&+ \beta_1\text{Operating margin}_{rt} + \beta_2\text{Leverage}_{rt} + \beta_3\text{Focus}_{rt} \\
&+ \beta_4\text{Concentration index}_{rt} + \beta_5\text{R\&D expenditure}_{rt} \\
&+ \beta_6\text{Advertising expenditure}_{rt} + \beta_7\text{Age of firm}_{rt} \\
&+ \beta_8\text{Acquisitions}_{rt} + \beta_9\text{Growth rate}_{rt} \\
&+ \gamma_{cb}\text{Corporate branding dummy}_{rt} \\
&+ \gamma_{hb}\text{House-of-brands dummy}_{rt} + \varepsilon_{rt},
\end{aligned}
$$

where r = 1, , R (firms), and t = 1, , T (years) Here, the βs and γs are parameters to be estimated, and we assume that the error term ε_{rt} is normally and independently distributed with common variance The β coefficients measure the effects of the control variables The coefficients (γ_{cb} and γ_{hb}) measure the average impacts of branding strategy on firm value for the subset of companies that employ the same branding strategy after accounting for the effects of several control variables, which are shown in Figure 1 According to our hypotheses, we expect that γ_{cb} is positive and γ_{hb} is negative We estimate a second specification of M1 with

TABLE 3
Hypotheses on Control Variables Used in the Model

Variable	Measure Used	Expected Relationship to Tobin's q	Support for Expectation
Operating margin	Ratio of net income before depreciation to sales	Positive (+)	Triggers expectations of future income potential
Leverage	Ratio of long-term debt to total assets	Not clear-cut	Literature shows both types of relationships
Firm's focus	Number of industry segments in which the firm operates	Not clear-cut	Literature shows both types of relationships
Concentration index	Herfindahl index using four-digit North American Industry Classification system codes	Negative (–)	Recent empirical evidence
R&D expenditures	R&D expenditures/total assets	Positive (+)	Future implied income due to R&D (previous research)
Advertising expenditures	Advertising expenditures/total assets	Positive (+)	Literature shows that advertising affects market evaluation
Age of firm	How long a firm has been in business	Negative (–)	Investors have more information on older firms
Acquisitions	Number of acquisitions in the preceding year	Negative (–)	Recent empirical evidence
Growth rate of sales	Compounded annual growth rate in sales for a three-year period	Positive (+)	Due to the forward-looking nature of Tobin's q

interaction terms between advertising expenditures and branding strategies This variant enables us to examine whether there is a differential impact of advertising expenditures with different branding strategies

Firm-Level Estimates

We employ a hierarchical model (M2) with random coefficients to estimate firm-level effects of branding strategy on Tobin's q This approach, which allows for parameter variations across firms (Hildreth and Houk 1968, Swamy 1974), has become popular in the marketing literature to represent heterogeneity in parameters (Allenby and Ginter 1995, Bradlow and Rao 2000, Lenk et al 1996) Accordingly, we posit a hierarchical Bayesian model in which we estimate the firm-level branding coefficients for each firm, assuming that they are randomly distributed around a common mean Our model at the firm level is as follows

$$
\begin{aligned}
(4)\quad Y_{rt} &= \text{Tobin's q for firm r at time t} = \beta_0 \\
&+ \beta_1\text{Operating margin}_{rt} + \beta_2\text{Leverage}_{rt} + \beta_3\text{Focus}_{rt} \\
&+ \beta_4\text{Concentration index}_{rt} + \beta_5\text{R\&D expenditure}_{rt} \\
&+ \beta_6\text{Advertising expenditure}_{rt} + \beta_7\text{Age of firm}_{rt} \\
&+ \beta_8\text{Acquisitions}_{rt} + \beta_9\text{Growth rate}_{rt} \\
&+ \gamma_{cb(r)}\text{Corporate branding dummy}_{rt} \\
&+ \gamma_{hb(r)}\text{House-of-brands dummy}_{rt} + \varepsilon_{rt},
\end{aligned}
$$

where r = 1, , R (firms), and t = 1, , T (years) As we did previously, we assume that the errors ε_{rt} are normally and independently distributed with common variance and that $\gamma_{cb(r)}$ and $\gamma_{hb(r)}$ are firm-specific coefficients

We also compare the results from Bayesian regression with those obtained from OLS regressions using a fixed-effects model In addition, we test the predictive validity of the two methods For this purpose, we withhold approximately one-fifth of the observations, reestimate the model, and compare the predictions from the model with the actual values for the withheld observations

Data Collection and Measures

Data Collection

Sample of firms We sought relevant financial and advertising data for companies in the Standard & Poor's index of the top 500 companies (S&P 500) for five consecutive years as of December 2000 (i e , 1996–2000) [5] However, because there was a lack of data on several variables, our final sample consisted of 113 firms (23% of S&P 500 firms), whose total market value was approximately 38% of that of all

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[5] We use mainly two data sources the 2000 CD-ROM "COMPUSTAT North America Data for Standard & Poor's Research Insight" for financial data and the *Competitive Media Reporting* annual books for advertising expenses

S&P 500 firms combined The average market value of our firms is approximately twice that of S&P 500 firms not in the sample Nevertheless, our sample compares quite favorably with the S&P 500 firms on four variables (Tobin's q, operating margin, leverage, and focus, as measured by the number of industry groups in which the firms operates) on the basis of multivariate T-tests for each year of the sample The values of Hotelling's T^2 values range from 0525 (degrees of freedom [d f] = 189 5) for 1996 to 3 10 (d f = 185 5) for 2000, and none are significant

Branding strategy codes We assigned one of the three branding strategy codes (corporate branding, mixed branding, and house of brands) to each firm on the basis of a review of the firm's Web site, an analysis of the firm's structure, the firm's brands listed in the 2000 *Competitive Media Reporting* report, and the most recent annual reports We also consulted revenue data to uncover the significance of a firm's business units and to identify the brands marketed by the business units Revenue analysis was especially relevant in cases in which it was unclear which code to assign to the branding strategy of the firm For example, an ambivalent case occurred if a firm predominantly used the corporate brand for its products and services but also owned a minor brand In such a case, we categorized the firm as having a corporate branding strategy

Two graduate students assigned the codes There was a high degree of consistency, and coder reliability, as measured by percentage agreement, was 867 In case of a divergence, one researcher evaluated the information and assigned a branding strategy code Overall, the classification was fairly straightforward and unambiguous Operationally, we used two dummy variables for the branding strategies of the firms, with effects coding as (1, 0) for corporate branding, (0, 1) for house of brands, and (–1, –1) for mixed branding

Normalization of the variables Many studies with diverse research objectives show that the affiliation with a particular industry explains part of the cross-sectional variation of the respective response variable To account for any systematic differences between industry groups and to make the measures comparable, we first calculated industry medians for the variables for groups based on two-digit North American Industry Classification System codes, and we normalized each firm's data relative to the respective industry medians We analyzed more than 20,000 cases for each year to obtain the year-specific medians for 30 industry groups We median-adjusted for Tobin's q, focus, operating margin, leverage, and R&D expenditures variables, which was possible because we had data at the industry group–level from the COMPUSTAT files We performed no such normalization for the remaining variables because we lacked data

Results and Interpretation

Descriptive Statistics

Table 4 shows the descriptive statistics and correlations Considerable variation occurs in this response measure (the median-adjusted Tobin's q), but the mean across all firms is 1 38 The firms in our sample operate in a wide range of industry segments (the median-adjusted value is 3 00, see the "Focus" row of Table 4) Similar variation occurs in other predictors as well This variation suggests that our sample is probably skewed toward better-performing firms than toward the population of firms included in the COMPUSTAT data set Most of the correlations are statistically significant from zero, and the multicollinearity among the variables is low

Before we analyze the results, recall that the dependent variable is Tobin's q, which represents the market's assessment of the future prospects for the firm compared with its book value Thus, the coefficients of the regression models signal prospects for future cash flows to the financial community We assess the results only from this market signal perspective, not from any normative view of the optimum strategy for the firm

Estimates of Effects at the Aggregate Level

Fit We first describe the analyses from Model M1, which provides estimates of the effects of branding strategy at the aggregate level We estimated this model with and without interactions of advertising and branding strategy dummies In each model, we used the core set of nine control variables (i e , focus, concentration index, operating margin, leverage, R&D expenditure, advertising expenditure, age of firm, number of acquisitions, and growth rate) The results of fit are shown in Table 5 The fits are all significant The inclusion of interactions between advertising and branding strategy dummy variables shows a small change (a slight decrease for M1A and a small increase for M1B) in the fit

Predictive testing The correlation between the predicted values and the actual values for the subset of randomly withheld 20% of observations is 621 for the models with and without interactions This is quite similar to the fit of the model to the data, therefore, it shows a good degree of predictive validity

Branding strategy coefficients The coefficients of the branding strategies in our measurement model of Tobin's q (normalized) after correcting for the control variables are shown in Table 5 for Models M1A and M1B In both specifications, we consistently find that the corporate branding coefficient is the largest and is positive, whereas the other two strategy coefficients (i e , house of brands and mixed branding) are negative Furthermore, the mixed branding strategy coefficient is the most negative [6] The relationships of branding strategy and Tobin's q are less pronounced when we include the interactions between the advertising variable and branding strategy dummy variables

The estimated coefficients of the branding strategy variables (measured in the normalized Tobin's q values) in the model without interactions (M1A) are 32 for corporate branding, – 09 for house of brands, and – 41 for mixed

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[6] In an analysis with a different sample of 75 firms, for which we use the COMPUSTAT data for advertising expenses, we find that the corporate branding strategy has the most positive effect on Tobin's q, and the order of the effects for the other two strategies is reversed Thus, it seems that our result on corporate branding strategy is quite robust

TABLE 4
Correlation Matrix for the Variables in Model M1

Means (Standard Deviation)	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 38 (2 33)	1 Tobin's q*	1													
11 (12)	2 Operating margin*	387 (00)	1												
029 (14)	3 Leverage*	– 257 (00)	232 (00)	1											
3 (3 85)	4 Focus*	– 056 (20)	146 (00)	194 (00)	1										
29 (21)	5 Concentration index	– 215 (00)	– 21 (00)	046 (00)	144 (00)	1									
– 018 (05)	6 R&D expenses/total assets*	121 (01)	– 4 (00)	– 435 (00)	– 08 (07)	– 03 (53)	1								
014 (02)	7 Advertising expenses/total assets	095 (03)	– 04 (32)	– 016 (72)	– 06 (21)	029 (50)	029 (51)	1							
67 18 (43 79)	8 Age of firm	– 232 (00)	052 (23)	2 (00)	258 (00)	1 (02)	– 31 (00)	14 (00)	1						
1 69 (2 78)	9 Number of acquisitions	195 (00)	– 04 (03)	308 (00)	001 (97)	– 09 (03)	035 (43)	– 17 (00)	– 13 (00)	1					
15 (31)	10 Three-year compounded annual growth rate	37 (00)	– 08 (06)	182 (00)	– 16 (00)	– 16 (00)	031 (47)	– 09 (05)	– 38 (00)	098 (02)	1				
– 096 (94)	11 Corporate branding dummy	254 (00)	095 (03)	– 129 (00)	– 11 (01)	– 07 (10)	191 (00)	– 2 (00)	– 37 (00)	– 13 (00)	224 (00)	1			
– 38 (67)	12 House-of-brands dummy	23 (00)	181 (00)	– 142 (00)	011 (80)	001 (97)	094 (03)	– 03 (54)	– 19 (00)	123 (00)	114 (01)	73 (00)	1		
– 0055 (02)	13 Corporate branding dummy × advertising/total assets	03 (49)	009 (83)	– 168 (00)	– 02 (67)	004 (97)	038 (39)	– 72 (00)	– 27 (00)	127 (00)	175 (00)	51 (00)	42 (00)	1	
– 0058 (02)	14 House-of-brands dummy × advertising/total assets	001 (97)	074 (09)	– 131 (00)	048 (27)	085 (05)	– 02 (70)	– 55 (00)	– 13 (00)	093 (03)	077 (08)	35 (00)	55 (00)	84 (00)	1

*Indicates median-adjusted

Notes Two-tailed significance levels are shown in parentheses for correlations

TABLE 5
Estimates for the Two Specifications of the Aggregate Model M1

	Conjecture on the Sign of the Coefficient	Model 1A: No Interactions		Model 1B: With Interactions	
Constant		52	(2 04)	60	(2 29)
Operating margin*	+	8 26	(10 23)	8 21	(10 07)
Leverage*	? (+/–)	–4 44	(–6 64)	–4 54	(–6 61)
Focus*	? (+/–)	013	(60)	01	(57)
Industry concentration	–	– 70	(–1 76)	– 64	(–1 58)
R&D expenditures/assets*	+	6 05	(3 09)	5 84	(2 94)
Advertising/assets	+	17 63	(4 57)	13 28	(2 20)
Age of firm	–	– 003	(–1 37)	– 003	(–1 41)
Number of acquisitions	–	01	(36)	01	(32)
Three-year compounded annual growth rate	+	1 69	(5 87)	1 69	(5 87)
Corporate branding dummy	+	32	(2 36)	26	(1 47)
House-of-brands dummy	–	– 09	(– 51)	11	(44)
Advertising × corporate branding dummy interaction		—		1 12	(11)
Advertising × house-of-brands dummy interaction		—		–7 79	(– 92)
Number of firms		113		113	
Sample size		531		531	
Adjusted R^2		393		393	
F-ratio, d f , *p*-value		32 35, 11, 520, 000		27 40, 13, 518, 000	

*Indicates that variables are median-adjusted
Notes t-values are in parentheses

branding[7] The coefficient of corporate branding is statistically significant, in support of H_1 However, the coefficient of house of brands, though negative, is not significant, which is not in support of H_2 However, when corrected for the sample selection bias with Heckman's (1979) two-step model, with the first step the selection of 113 companies, the revised estimates for the branding strategy dummy variables in Model M1A are somewhat lower but highly significant, the corrected values are 181 and – 052, with respective t-values of 5 12 and –4 23 Thus, we conclude that the data support H_1 and H_2

When we introduced interactions between advertising and branding strategy variables in Model M1B, the estimates of the two branding strategy coefficients and interactions were not significant (even after we corrected for the selection bias) The data do not support H_3 However, the magnitudes of the interactions suggest that if a firm follows a corporate branding strategy, an increase in advertising expenditures increases Tobin's q, but that change is negative if it follows a house-of-brands strategy A potential reason for this is that investors regard higher advertising expenditures under corporate branding as beneficial for a portfolio of brands with a common brand name, investors may consider such an increase under a house-of-brands strategy harmful (in our sample, a company that adopts the house-of-brands strategy spends an average of $285 million on advertising, compared with an average of $74 million for a company that adopts a corporate branding strategy)

Coefficients of control variables The coefficients of most of the control variables (also shown in Table 5) are in the expected direction for both M1A and M1B of Model M1 All control variables are significant except for focus, industry concentration, age of firm, and number of acquisitions It seems that the concentration of a firm on a small number of businesses has no influence on the firm's intangible value

As might be expected, the growth rate coefficient is positive and significant, which reaffirms the forward-looking nature of the response variable (Tobin's q) In a similar manner, the coefficients of operating margin, advertising, and R&D expenditures are all positive and significant, as we expected

The leverage variable has a negative coefficient and seems to be consistent with the ambiguity of its effect in the literature McConnell and Servaes (1990), who analyzed data for 1976 and 1986, show a positive effect Our analysis period (1996–2000) is characterized by much higher price-to-earnings ratios in the stock market Thus, an explanation for our significant, negative finding is that the market values firms with a high Tobin's q more as a result of their high perceived future cash flows The current cash flow for such firms is usually limited, and thus they cannot take on much debt, which results in lower leverage This might explain the strong, negative correlation of leverage and Tobin's q In addition, Smith and Watts (1992) find that firms with higher growth options have lower leverage, in support of our argument

Firm-Specific Estimates

We now turn to Model M2, in which we allowed all specified regression coefficients to vary randomly around a mean value Furthermore, we specified the two branding strategy parameters to be different for each firm We estimated this random-coefficient[8] hierarchical Bayesian model using Markov chain Monte Carlo methods [9] We estimated a total of 261 parameters in this analysis, 90% of them passed Heidelberger and Welch's (1983) stationarity test [10] The results shown in Table 6 are for the subset of iterations after convergence has been reached

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[7] Our analysis assumes that the aggregate effects of the branding strategy are fixed because the strategies do not vary in the period of the data We applied the Hausman–Taylor (1981) instrument variable method, which allows for a consistent estimate of the time-fixed strategy variables using the cross-sectional time-series nature of the data Corporate brand coefficients were still the highest, and mixed branding coefficients the lowest

Fit Using the average of the residual sum of squares across iterations, we computed a pseudo R^2 to examine the degree of fit This pseudo R^2 is 655, which shows an excellent fit of the Bayesian model to the data A comparison with the R^2 of 393 for Model M1A indicates that the aggregate-level Model M1 did not account for a considerable degree of heterogeneity among the sample firms

Predictive validity We reestimated the hierarchical Bayesian regression model for a sample of 418 (80%) observations, after we randomly deleted one observation for every firm The estimates converged, and the results are comparable to those from the full model We used the firm-level results to predict the value of the (median-adjusted) Tobin's q for the prediction set The Pearson's correlation between the actual and predicted values is quite high ($r =$ 805, $p =$ 01) This analysis shows high predictive value of our firm-specific results

Effects of branding strategies The summary statistics of the effects of the branding strategies across the 113 firms, as estimated by Model M2, are shown in Table 7 Similar to the results in Model M1, the coefficient of corporate branding is the largest and is positive, followed by those of house of brands (second) and mixed branding (third and negative)

Figure 2 shows the means and the 2 5%–97 5% intervals for the 113 firm-specific estimates of the three branding strategy effects Figure 2 attests to the existence of considerable variation among the sample of firms used in this study

Effects of other variables In Table 6, we show the overall parameter estimates and the standard errors of the posterior distributions for the control variables for Model M2 In general, the estimates correspond quite well with the Model M1 results for the control variables

A way to visualize the impact of branding strategy on Tobin's q value is to calculate the predicted Tobin's q for a typical firm under the assumption that it follows each of the three branding strategies For Model M2, the predicted average across the strategies is 1 34, which compares quite well with the actual average of 1 38 (shown in Table 4) However, these predictions vary by the type of branding strategy 1 82 for corporate branding, 1 15 for house of brands, and 1 05 for mixed branding Compared with the corporate branding strategy, the house-of-brands and mixed branding strategies show reductions in Tobin's q of 37% and 42%, respectively It seems that investors indeed prefer the corporate branding strategy for a firm

Inferred best strategies We performed a similar analysis for all 113 firms and determined the best strategy for the firm to follow if its objective is to maximize the impact of its intangible value (Tobin's q) In Table 8, we compare the best strategies, based on Model M2, with the branding strategies manifest by the firms

It seems that firms might be better off adopting either a corporate branding or a mixed branding strategy rather than a house-of-brands strategy if their objective is to increase intangible value This analysis indicates that 39 (20 + 2 + 17) firms (or 35%) manifest the "best" branding strategy that maximizes Tobin's q (or the market value criterion) Furthermore, 50% (56 of 113) of firms might be better off using the corporate branding strategy if their objective is to maximize Tobin's q values

Estimates for selected firms Examining detailed estimates for various firms, we find that EMC Corporation, Dell Computers, and Microsoft have the highest corporate branding strategy coefficients, note that all three firms manifest a corporate branding strategy In addition, the three firms have the most negative estimates for the mixed branding strategy, which seems to suggest that they are following an optimum strategy from the financial market perspective

TABLE 6
Model M2 Results for Control Variables

Variable	Mean	Pseudo t-Values
Operating margin*	7 840	(7 62)
Leverage*	–4 447	(–5 33)
Focus*	037	(1 78)
Industry concentration	– 902	(–1 60)
R&D expenditures/assets*	265	(11)
Advertising/assets	19 920	(3 89)
Age of firm	– 006	(–1 76)
Number of acquisitions	013	(38)
Three-year compounded annual growth rate	660	(1 70)

*Indicates that variables are median-adjusted

TABLE 7
Summary Statistics of Branding Strategies

	Corporate Branding	House of Brands	Mixed Branding
Mean	472	– 195	– 277
Standard deviation	965	242	1 14
Range	(–1 80, 3 96)	(–1 09, 63)	(–4 20, 2 53)

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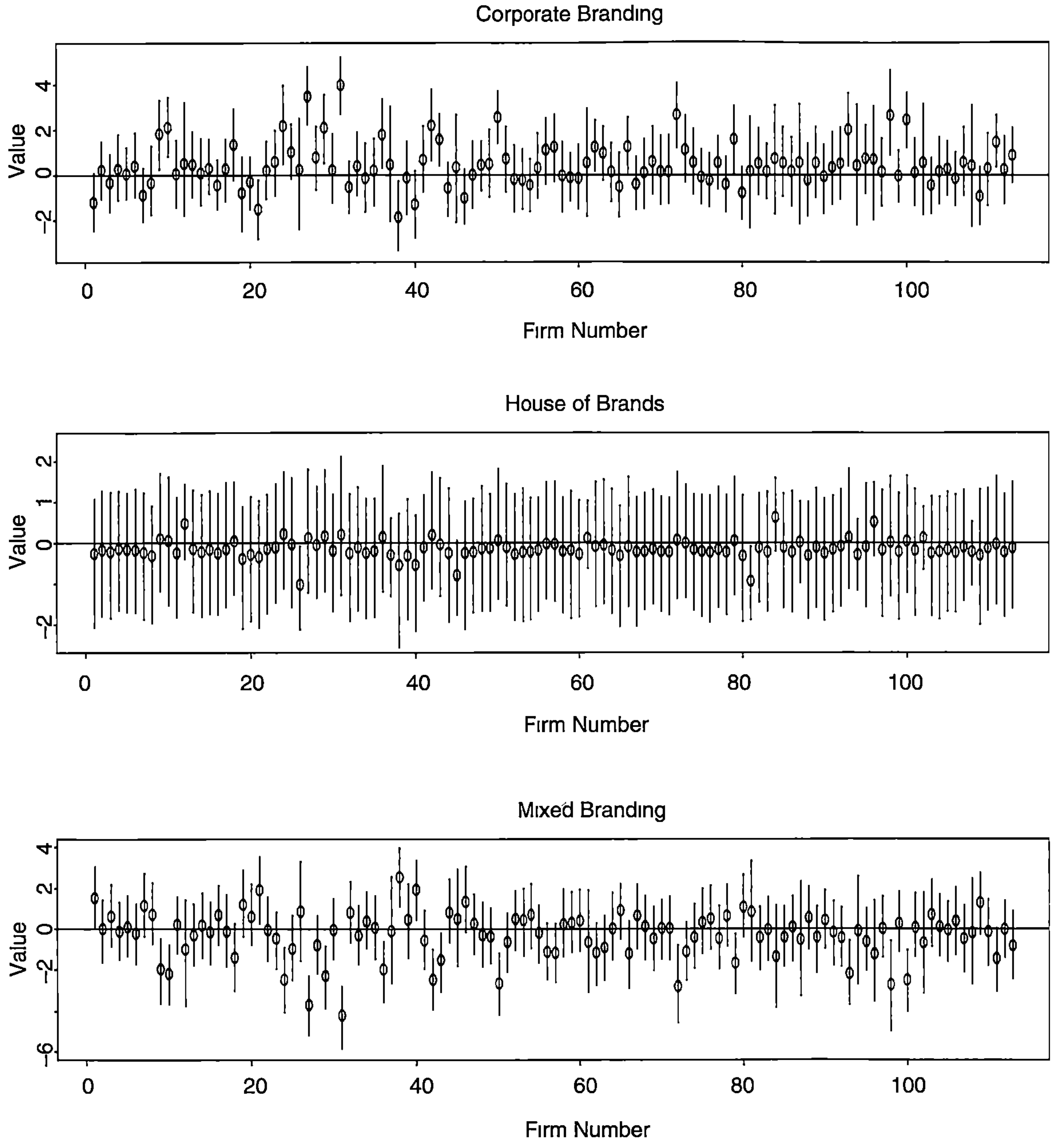
[8] We compared the OLS model (M1) with fixed effects with a model in which the brand strategy coefficients were random, and we found that the model with random coefficients provides a better fit (the chi-square value for the model comparison is 112, with 2 d f) This analysis provides some support for use of a random-coefficients Bayesian model to determine firm-specific effects

[9] We use WinBugs (Spiegelhalter, Thomas, and Best 1999) for the estimation We assumed diffuse and noninformative prior distributions for the parameters so that the data primarily determine the posterior distributions

[10] In the Markov chain Monte Carlo iterations, we burned in 11,000 iterations and used the next 5000 iterations, thinned by 10, to test for convergence using Bayesian output analysis (Smith n d) We used the last 1000 iterations to report the results

Figure 2
Firm-Level Estimates of Effects of Branding Strategy


Corporate Branding

House of Brands

Mixed Branding

Computer Associates, which follows a corporate strategy, has an estimated coefficient among the lowest for corporate branding but among the highest for mixed branding, which implies that investors may evaluate the firm more highly if it can implement a change in its branding strategy We hasten to add that such a conjecture is speculative

Most of the house-of-brands coefficients are not significant, except for PPG Industries and Darden Restaurants Both firms currently follow the house-of-brands strategy, but the estimates for this strategy are the most negative for them, which implies that they might benefit from the investor perspective if they have the option of following a different strategy The highest estimates for a mixed branding strategy are for The Gap and Gillette, both of which have the same manifest strategy

Implications and Future Research Directions

Summary

This article reports the results of an empirical analysis to determine the relationship between a firm's branding strategy and its intangible value, as measured by Tobin's q We controlled for nine predictors (i e , focus, concentration index, operating margin, leverage, R&D expenditures, advertising expenditures, age of firm, acquisitions, and

TABLE 8
Inferred Best Strategies

Manifest Branding Strategy	Best Strategy for Improving Tobin's q (Inferred)			
	Corporate Branding	House of Brands	Mixed Branding	Total
Corporate branding	20	7	18	45
House of brands	6	2	4	12
Mixed branding	30	9	17	56
Total	56	18	39	113

growth rate) and industry grouping variables while estimating the impact of branding strategies on Tobin's q To account for the interfirm variation in the measures we used in the study, we normalized five variables (i e , Tobin's q, operating margin, leverage, focus, and R&D expenditures) by subtracting the median values of the firms' corresponding industry groups We formulated two sets of models in this work and estimated one set by simple regression methods and the other by hierarchical Bayesian methods The Bayesian methods enabled us to determine the impact of branding strategies at the firm level In general, the results we obtained are consistent Furthermore, the predictive validity of our second model is quite high

In general, our results on the impact of the control variables are in line with what has been reported in the literature This finding gives us confidence in interpreting the effects of branding strategies on the financial value of a firm

The coefficient of the corporate branding strategy measured in normalized Tobin's q values is highest, followed by the house-of-brands strategy, the mixed branding coefficient is lowest We find considerable stability in the order of effects of the three branding strategies The effects of branding strategies become more pronounced when we include interactions between the type of branding strategy and advertising expenditures in the model We also find that approximately 65% of the firms in our sample do not manifest the best strategy possible *if* their objective is to improve Tobin's q

Discussion

Our primary result, that corporate branding is more positively related to the intangible firm value than are house of brands and mixed branding, may appear to be inconsistent with the concept of market segmentation, which should support implementation of a house-of-brands or mixed branding strategy However, we recall that our dependent measure is an assessment by the financial community, specifically investors, of a firm's value Although investors have increasingly come to acknowledge the financial value of brands, it can be presumed that they are not familiar with which brands constitute firms' brand portfolios It is reasonable to assume that the financial community is more aware of corporate brands than of the individual brands of a firm that follows a house-of-brands strategy Moreover, financial experts might not value house-of-brands strategies appropriately and might underestimate the potential benefits of a differentiated branding approach for diverse target segments and products In addition, from a risk management perspective, the investment community might underappreciate that a multitude of brands (i e , a house-of-brands strategy) distributes risk over more brands, thus improving firms' financial risk profile This effect does not seem to be reflected in the financial evaluation of a firm that pursues a house-of-brands strategy The finding that financial valuations are not based solely on purely rational criteria is in line with Frieder and Subrahmanyam's (2002) finding about investors' stock decisions They find that the perceived quality of brands has an influence on stock holding decisions In addition, they point out that familiarity with brands influences investment decisions, and they observe a "home bias" (i e , preference for domestic stocks)

We classified the 113 firms into three broad groups 40 business-to-consumer (B2C) (mainly consumer goods companies), 33 business-to-business (B2B) (mainly industrial goods companies), and 30 mixed We estimated Model M1 for the subgroups to determine whether there were any systematic differences among them In general, a B2B firm has a few organizations as its customers Furthermore, a B2B firm tends to build customer relationships at an organizational level Accordingly, we conjectured that a B2B firm's customers depend on the name of the firm more than on a specific brand name as a guide in making purchase decisions In a similar manner, a B2C firm devotes its resources (e g , advertising) to create distinct positions for its brands under the house-of-brands strategy and attempts to differentiate its offering in a product category for the end users (consumers) Thus, we were interested in examining any differences across the broad categories The effect of a corporate branding strategy was significant for B2C and B2B firms, and the coefficient was higher for B2B firms Furthermore, the house-of-brands strategy effect was not significant for B2B firms, though it was significant and negative for B2C firms

A firm's manifest branding strategy largely depends on various corporate decisions, such as mergers and acquisitions, global expansion, and the selection of which business fields to compete in (Laforet and Saunders 1999) Therefore, general recommendations to firms about the type of branding strategy cannot be derived from this research Nevertheless, our study shows how different branding strategies are associated with different effects on the intangible firm value Moreover, our analysis can assist analysts in computing the level of expenditures on advertising necessary to obtain a desired financial value for a firm with a given branding strategy

Further Research

The Bayesian regression model we used in this study is quite versatile and is useful in estimating individual-level parameter estimates Our approach can be applied to various marketing situations, particularly ones that estimate aggregate-level effects with replicated data on a sample of individual units We show that it is possible to estimate effects (of marketing variables) at the individual unit level

A related work by Hogan and colleagues (2002) suggests linking customer assets to a firm's financial performance through the basic customer lifetime value model In principle, branding strategies should increase the value of a firm's customer assets However, no research has explored how different branding strategies affect customer assets It can be conjectured that corporate branding strategy adds more value to customer assets because of its higher effectiveness in cross-selling

We point out that our analysis is not free of limitations For example, our sample of firms (n = 113) is not truly representative of the population of firms in the economy, however, as we have showed, it is a good subsample of the largest 500 firms In some industries, there are only a few firms in our sample Our analysis examines the level of the firm as a whole, whereas a firm may adopt detailed branding strategies for each of its business units and products Furthermore, our coding of branding strategies is not as refined as we would have liked A more refined brand strategy coding may involve multiple categories for mixed branding

Our analysis considers competition effects only indirectly through the use of the concentration index However, we do not account for the direct effects of competition As a firm's competitor expands into other products and categories with a particular branding strategy, the firm almost necessarily adapts its own branding strategy to address any harmful effects on its own growth This issue may have had a formative effect on the manifest branding strategies of firms such as Procter & Gamble (versus Unilever) and Coke (versus Pepsi) Although we cannot address the issue of competitive effects in our analysis because we lack appropriate data, we believe that it is important for further research [11]

Our empirical work is necessarily correlational because the branding strategy codes did not change over the period of analysis A topic for further research is to examine the interdependence of the branding strategy and firm's intangible value, this would require a much longer time series of data and appropriate econometric methods (Granger 1969)

A natural extension of this work is to analyze the effect of a branding strategy with data at the business unit level Although the current accounting systems do not allow for such an analysis, we expect that future systems will be more disaggregate

Finally, it is critical to replicate this analysis and test whether our results hold for other samples of U S and international firms Our analysis can be extended to include other descriptors of firms and for longer periods Furthermore, an examination of the financial impact of branding strategies at the level of individual brands or strategic business units, at least for a few companies, would be beneficial, however, we realize that such an exercise is quite difficult because of the paucity of financial data at those levels

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[11] We thank an anonymous reviewer for pointing out this issue

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New Products, Sales Promotions, and Firm Value: The Case of the Automobile Industry

Year after year, managers strive to improve financial performance and firm value through marketing actions such as new product introductions and promotional incentives. This study investigates the short- and long-term impact of such marketing actions on financial metrics, including top-line, bottom-line, and stock market performance. The authors apply multivariate time-series models to the automobile industry, in which both new product introductions and promotional incentives are considered important performance drivers. Notably, whereas both marketing actions increase top-line firm performance, their long-term effects strongly differ for the bottom line. First, new product introductions increase long-term financial performance and firm value, but promotions do not. Second, investor reaction to new product introduction grows over time, indicating that useful information unfolds in the first two months after product launch. Third, product entry in a new market yields the highest top-line, bottom-line, and stock market benefits. Managers may use these results to justify new product efforts and to weigh short- and long-term consequences of promotional incentives.

For most firms, successful new products are engines of growth (Cohen, Eliashberg, and Ho 1997). Several frameworks, including the product life cycle and the growth–share matrix, postulate the need for new products that generate future profitability and prevent the obsolescence of the firm's product line (Chaney, Devinney, and Winer 1991; Cooper 1984). Indeed, Arthur D. Little consultants conclude from a *Fortune* poll that innovative companies achieve the highest shareholder returns (Jonash and Sommerlatte 1999). At the same time, the new product failure rate is high (ranging from 33% to greater than 60%) and has not improved in the past few decades (Boulding, Morgan, and Staelin 1997; McMath and Forbes 1998; Wind 1982). Moreover, even commercially successful new products may not benefit a firm financially because of high development and launch costs and quick imitation by competitors (e.g., Bayus, Jain, and Rao 1997; Chaney, Devinney, and Winer 1991).

In contrast, sales promotions are effective demand boosters that do not incur the risks associated with new products (Blattberg and Neslin 1990). Sales promotions are relatively easy to implement and tend to have immediate and substantial effects on sales volumes (Hanssens, Parsons, and Schultz 2001, Chap. 8). Consequently, the relative share of promotions in firms' marketing budgets continues to increase (Currim and Schneider 1991). However, sales promotions rarely have persistent effects on sales, which tend to return to prepromotion levels after a few weeks or months (Dekimpe, Hanssens, and Silva-Risso 1999; Nijs et al. 2001; Pauwels, Hanssens, and Siddarth 2002; Srinivasan, Leszczyc, and Bass 2000). Consequently, promotions' effectiveness in stimulating long-term growth and profitability for the promoted brand is in doubt (Kopalle, Mela, and Marsh 1999).

What are the long-term financial consequences, if any, of these two distinct marketing actions? This is an important question raised by many chief executive officers (CEOs) and chief financial officers (Marketing Science Institute 2002). It is also a difficult question because there are several metrics of financial performance, including revenue (top-line performance), profit (bottom-line performance), and firm value (performance in investor markets). In addition, it is difficult to distinguish between the short- and long-term effects of marketing actions.

Research in this area has focused mainly on the revenue and profit effects of new products, such as demonstrating their benefits in the personal computer industry (Bayus, Erickson, and Jacobson 2003). In terms of investor impact, it is known that new product announcements generate small

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excess stock market returns for a few days (Chaney, Devinney, and Winer 1991, Eddy and Saunders 1980) and that additional excess returns can be created when the new product is launched in the market (Kelm, Narayanan, and Pinches 1995) As for sales promotions, their effect on revenues is typically positive, albeit short-lived (Srinivasan et al 2004), whereas their profit impact is often negative (Abraham and Lodish 1990) It is not known whether investors react to firms' promotion strategies, nor is it known how such a reaction, if present, compares with the effects of new product introductions

In this study, we compare the effects of new product introductions and sales promotions on the firm's top-line, bottom-line, and investor performance We choose the automobile industry for our focus because of its economic importance and its reliance on both new product introductions and sales promotions Indeed, the automobile business represents more than 3% of the U S gross domestic product (J D Power and Associates [JDPA] 2002a) and accounts for one of seven jobs in the U S domestic economy (Tardiff 1998) Ever since consumers became interested in car styling in the 1920s, manufacturers have invested in innovation in the form of product-line changes (Farr 2000, Menge 1962) However, the costs of such styling changes can be substantial, from up to $100 million in the late 1950s to $4 billion in recent years (Sherman and Hoffer 1971, White 2001) Moreover, the success of styling changes is far from certain, even with extensive marketing research, because product development begins several years before the public launch (Farr 2000)

Research has shown that, overall, styling changes tend to increase sales but often do not pay off financially (Hoffer and Reilly 1984, Sherman and Hoffer 1971) However, these conclusions do not consider entry into new categories (e g , sport-utility vehicles [SUVs]), nor do they account for potential long-term benefits to top-line performance (e g , from repeat purchases or replacement sales), bottom-line performance (e g , from spreading development costs over multiple vehicles), or firm value (e g , from spillover benefits of successful new products to the manufacturer's image)

Car manufacturers (especially the "big three" U S companies) increasingly use sales promotions as incentives to boost sales and to optimize capacity use in a tough market environment (*BusinessWeek* 2002) However, concerns about the long-term profitability of such actions persist (*The Wall Street Journal* 2003) Recently, Chrysler's CEO, Dieter Zetsche, told the *Financial Times* that his forecasted sales gain of one million cars in the following five to ten years "[would] be driven by 12 new product introductions in the next three years rather than by low pricing" (JDPA 2002b, p 1)

The remainder of this article is organized as follows We first examine how new products and promotions affect financial performance and valuation over time, and we specify a comprehensive model to quantify the relationships Next, we discuss the marketing and financial data sources and estimate the models We then formulate conclusions, cross-validate the empirical results, and discuss their strategic implications for marketing

Research Framework and Methodology

We begin by considering how new product introductions and promotional incentives influence top-line (firm revenue), bottom-line (firm income), and stock market (firm value) performance We formulate requirements for a model that aims to capture the long-term effects of such marketing actions on the performance variables Finally, we show how a vector-autoregressive (VAR) model satisfies the requirements, and we detail the empirical estimation steps

Short- and Long-Term Performance Effects of Marketing

The top-line performance of new products has been studied extensively in the diffusion-of-innovation literature (e g , Mahajan and Wind 1991) Among the major findings are that revenue from new products may take considerable time to materialize and that revenue levels depend on several factors, including the degree of product innovation In addition, new product introductions may have a persistent effect on revenues, compared with the effects of price promotions, which typically produce only temporary benefits (Nijs et al 2001, Pauwels, Hanssens, and Siddarth 2002, Srinivasan, Leszczyc, and Bass 2000) Therefore, the assessment of new product and promotional effects on revenue should distinguish short-term (immediate or same-week) effects and long-term effects, which can be temporary (adjustment, dust settling) or persistent (permanent) [1]

Bottom-line financial performance may benefit from new product introductions through increased demand, increased profit margin, and lower customer acquisition and retention costs (Bayus, Erickson, and Jacobson 2003) Geroski, Machin, and Van Reenen (1993) note that a new product can have a temporary effect on a firm's financial position because of the specific product innovation, or it can have a permanent effect because it transforms competitive capabilities However, several factors can jeopardize such long-term profit benefits, even when top-line performance increases (Sherman and Hoffer 1971) Development and production costs are considerable, notably in the automobile industry, in which new-car platforms cost more than $1 billion (*The Wall Street Journal* 2002b) New product launches consume considerable marketing resources, especially for a major innovation Similarly, the profitability of promotional incentives is far from certain (Abraham and Lodish 1990, Srinivasan et al 2004)

The firm valuation (stock price) implications of marketing activities have not received much research attention to date In general, it is known from the efficient-market hypothesis that stock prices follow random walks The current price reveals all the known information about the firm's future earnings prospects, and shocks (surprises) that alter earnings expectations are incorporated immediately (Fama and French 1992) Therefore, the stock market may not react to new product introductions because a firm's current valuation already incorporates the launch, either because it was preannounced or leaked or because the company is known to be an innovator and is expected to produce a steady flow of new products Instead, the stock market reacts to the extent that the new product introduction updates the forecasts of the firm's future returns (Ittner and Larcker 1997) If investors consider the new product introduction favorably (i e , expectations are exceeded), the stock price will increase to reflect the expected net sum of future discounted cash flows that result from the new product (Wittink, Ryans, and Burus 1982, p 3)

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[1] Persistent (permanent) effects are defined as the difference between baseline performance before the marketing action and baseline performance after the action's effects have stabilized For a detailed explanation of the time frame distinctions, see Pauwels, Hanssens, and Siddarth (2002)

However, the efficient-market perspective also acknowledges that investors do not always correctly and immediately forecast the firm's future returns (e g , Ball and Brown 1968) Although investors have expectations of the firm's general capability in new product introductions, the market success of any specific introduction is usually in doubt (*The Wall Street Journal* 2002a, Wittink, Ryans, and Burus 1982) Specifically, investors need to assess two major uncertainties correctly the probability of new product success and the level of profits associated with the product (Chaney, Devinney, and Winer 1991) On the one hand, the stock market may overreact to a product introduction that eventually does not become a financial success (Chaney, Devinney, and Winer 1991) On the other hand, investors may underreact as they focus on current rather than future revenue streams (Michaely, Thaler, and Womack 1995) Therefore, investors should not be expected to be fully able to predict the total financial effects over time of new product introductions at the time of launch Instead, investors update their evaluation of introductions over time Helpful information is contained in early success measures such as low "days-to-turn" and high initial satisfaction ratings, which indicate high product popularity in the target market and the absence of major technical problems Therefore, the short-term investor reaction may adjust over time until it stabilizes in the long run as the new product's performance becomes so predictable that it loses its ability to adjust stock prices further

A similar argument can be developed with respect to promotion effects on valuation Given the positive revenue effects of promotions for manufacturers, some positive investor reaction can be expected in the short run However, because promotion effects on sales are typically short lived, it is not evident a priori whether the positive investor reaction will persist, dissipate, or turn around

Finally, we recognize that dynamic feedback loops may exist among marketing variables, among performance variables, and between marketing and performance variables Marketing actions such as new product introductions and promotional incentives often become associated with one another over time (Dekimpe and Hanssens 1999, Pauwels 2004) Successful new product introductions can increase a brand's price premium and make promotions redundant In contrast, a prolonged absence of successful new product introduction may force a company to use promotional incentives to "move product" (*The Wall Street Journal* 2002a) Similarly, revenue performance may act as an intermediate variable between marketing actions and firm value For example, successful new products lead to higher revenues and profits, which in turn can be used to launch other new products (Kashani 2003) Likewise, lackluster revenue performance may prompt some companies to engage in aggressive rebate tactics in an effort to boost sales (*USA Today* 2002)

Model Requirements

On the basis of these considerations, we maintain four criteria for our model of dynamic interactions among marketing and performance variables First, the model should provide a flexible treatment of both short- and long-term effects (Dekimpe and Hanssens 1995) Second, the model should be robust to deviations from stationarity, particularly the presence of random walks in stock prices, which can lead to spurious regression problems (Granger and Newbold 1986) [2] Third, the model should provide a forecast and expected baseline for each performance variable, so that we can capture the impact of unexpected events as deviations from the baseline Both econometric models and survey methods have been shown to perform well in generating these expectations (Cheng, Hopwood, and McKeown 1992, Fried and Givoly 1982) Consequently, our model uses forecasts based on an econometric model and controls for changes in analyst earnings expectations Fourth, the model should allow for various dynamic feedback loops between marketing and business performance variables

In summary, the study of the longitudinal impact of new product introductions and promotional incentives requires a carefully designed system of equations that accounts both for the time-series properties of performance and marketing variables and for their dynamic interactions

VAR Model Specification

We used VAR models, which are well suited for measuring the dynamic performance response and interactions between performance and marketing variables (Dekimpe and Hanssens 1999) Both performance variables and marketing actions are endogenous (i e , they are explained by their own past and by the past of the other endogenous variables) Specifically, VAR models not only measure direct (immediate and lagged) response to marketing actions but also capture the performance implications of complex feedback loops For example, a successful introduction generates higher revenue, which may prompt the manufacturer to reduce sales promotions in subsequent periods The combination of increased sales and higher margins may improve earnings and stock price and thus further enhance the effectiveness of the initial product introduction over time Because of such chains of events, the full performance implications of the initial product introduction may extend well beyond the immediate effects

Depending on the order of integration of the data, VAR models are specified in levels or changes Our unit-root tests (Enders 1995) reveal evolution in performance variables but stationarity for new product introductions and sales promotions [3] Consequently, the VAR model for each brand j in category k from firm i is specified as follows

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[2] Stationary variables fluctuate as temporary deviations around a fixed mean or trend Evolving variables, such as random walks, have a unit root (i e , they fluctuate without reverting to a fixed mean or trend) For technical definitions and applications in marketing, see, for example, Dekimpe and Hanssens (1995)

$$(1)\quad \begin{bmatrix} \Delta VBR_{i,t} \\ \Delta INC_{i,t} \\ \Delta REV_{i,t} \\ NPI_{ijk\,t} \\ SPR_{ijk,t} \end{bmatrix} = C + \sum_{n=1}^{N} B_n \begin{bmatrix} \Delta VBR_{i,t-n} \\ \Delta INC_{i,t-n} \\ \Delta REV_{i,t-n} \\ NPI_{ijk\,t-n} \\ SPR_{ijk,t-n} \end{bmatrix}$$

$$+ \Gamma \begin{bmatrix} \Delta S\&P500_t \\ \Delta Construct_t \\ \Delta Exchange_t \\ \Delta EPS_{i\,t} \end{bmatrix} + \begin{bmatrix} u_{VBRi,t} \\ u_{INCi\,t} \\ u_{REVi,t} \\ u_{NPIijk\,t} \\ u_{SPRijk\,t} \end{bmatrix},$$

with B_n, Γ vectors of coefficients, $[u_{VBRi,t}, u_{INCi,t}, u_{REVi,t}, u_{NPIijk,t}, u_{SPRijk,t}]' \sim N(0, \Sigma_u)$, N as the order of the VAR system based on Schwartz's Bayesian information criterion (SBIC), and all variables expressed in logarithms or their changes (Δ) In this system of equations, the first equation explains changes to firm value, which we operationalize as the ratio of the firm's market value to book value (VBR) (Miller and Modigliani 1961) [4] This variable reflects a firm's potential growth opportunities and is frequently used to assess a firm's ability to achieve abnormal returns relative to its investment base (David et al 2002) The second and third equations explain the changes in, respectively, bottom-line (INC) and top-line (REV) financial performance of firm i The fourth and fifth equations model firm i's marketing actions, that is, new product introductions (NPI) and sales promotions (SPR) for brand j in product category k

With respect to the exogenous variables in this dynamic system, we control for seasonal demand variations in vector C (Labor Day weekend, Memorial Day weekend, and the end of each quarter) and for fluctuations in the overall economic and investment climate (Standard and Poor's [S&P] 500 index, construction cost index, and dollar–yen exchange rate) [5] Finally, we account for the impact of stock market analysts' expectations of earnings per share (EPS) (Ittner and Larcker 1997)

Note that the VAR-forecast baseline of market-to-book ratio includes changes to the S&P 500 index, which is the sole predictor of a firm's stock price in the market model used by event studies to calculate excess returns (Chaney, Devinney, and Winer 1991, Eddy and Saunders 1980) In contrast, our model develops a more refined forecast baseline, which also includes changes to the construction cost index and to firm-specific earnings forecasts and financial performance An argument could be made for an even more extensive VAR model specification (e g , simultaneous inclusion of competitive product-introduction and promotion variables) However, we want to avoid overparameterization effects on our estimates (Abadir, Hardi, and Tzavalis 1999, Pesaran and Smith 1998), and we aim to balance completeness and parsimony Permanent effects in the VAR models are possible whenever performance variables are evolving, and SBIC implies lag lengths that balance model fit and complexity

Vector-autoregressive models have been used extensively in both the marketing and the finance literature For example, they are used to assess the short- and long-term performance effects of marketing activities such as advertising, distribution, nonprice and price promotions, store-brand entry, and product-line extensions (Bronnenberg, Mahajan, and Vanhonacker 2000, Dekimpe and Hanssens 1999, Nijs et al 2001, Pauwels 2004, Pauwels, Hanssens, and Siddarth 2002, Pauwels and Srinivasan 2004, Srinivasan et al 2004) In the finance literature, VAR models have been used to study the relationships within and between stock markets (Eun and Shim 1989), the relationships between capital flows and equity returns (Froot and Donohue 2002), the impact over time of monetary policy on stock market returns (Thorbecke 1997), and the effect of credit interruptions on the economy (Mason, Anari, and Kolari 2000)

Long-Term Impact of Marketing Actions: Impulse-Response Functions

The VAR model estimates the baseline of each endogenous variable and forecasts its future values on the basis of the dynamic interactions of all jointly endogenous variables Based on the VAR coefficients, impulse-response functions track the impact over time of unexpected changes (shocks) in the marketing variables on forecast deviations from the baseline for the other endogenous variables This conceptualization closely reflects previous studies of market performance (e g , Dekimpe and Hanssens 1999), financial performance (e g , Srinivasan et al 2004), and stock prices (e g , Erickson and Jacobson 1992) As Mizik and Jacobson (2003, p 21) argue, "when an unanticipated change in strategy occurs, the markets react and the new stock price reflects the long-term implications such change is expected to have on future cash flows "

To derive the impulse-response functions of a marketing action, we compute two forecasts, one based on an information set without the marketing action and the other based on an extended information set that accounts for the marketing action The difference between the forecasts measures the incremental effect of the marketing action This model feature is especially attractive in our investigation of stock market performance, because investors react to shocks, or deviations from their expectations In the finance area, these expectations derive from econometric forecasting models based on the firm's financial performance records, and the shocks are the model forecast errors (e g , Cheng and Chen 1997) The VAR model is a sophisticated version of such an econometric forecast In addition, the dynamic effects are not restricted in time, sign, or magnitude a priori We adopt the generalized, simultaneous-shock approach (Dekimpe and Hanssens 1999) in which we use the information in the residual variance–covariance matrix of the VAR model to derive a vector of *expected* instantaneous shock values Because we estimate a model in logarithms, the short- and long-term performance impact estimates are elasticities (Nijs et al 2001) Finally, we follow established practice in marketing research and assess the statistical significance of each impulse-response value by applying a one-standard error band (e g , Nijs et al 2001), as in the work of Pesaran, Pierse, and Lee (1993) and Sims and Zha (1999)

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[3] We also performed a cointegration test for the existence of a long-term equilibrium among the evolving variables The test result was negative Detailed results are available on request from the first author

[4] Other measures of firm value include return on assets, return on sales, and return on equity However, these measures focus on the short run, they are not risk adjusted, and their typical level of temporal aggregation makes it more difficult to link them to specific new product introductions Furthermore, because accounting measures are based on historical data, they do not adequately reflect future expected revenue streams (Kalyanaram, Robinson, and Urban 1995)

[5] Although inclusion of the transportation index appears more relevant than the construction index, the "big six" car manufacturers account for much of the variation in this index, which could cause an endogeneity bias We performed a sensitivity analysis with the transportation index and found similar results

Relative Importance of Marketing Actions: Forecast-Error Variance Decomposition

Although impulse-response functions trace the effects of a marketing change on performance, forecast-error variance decomposition (FEVD) determines the extent to which the performance effects are due to changes in each of the VAR variables (Hamilton 1994) Thus, the variance decomposition of firm value provides information about the relative importance of previous firm value, bottom- and top-line performance, new product introductions, and promotions in determining deviations of firm value from baseline expectations Of particular importance is the comparison of the short- and long-term FEVD For example, this comparison may reveal that the initial movements in stock price are mainly due to promotion shocks but that, over time, the contribution of new product introductions gradually becomes stronger Moreover, FEVD addresses the role of the intermediate performance metrics (revenue and profit) In our context, new product introductions may affect firm value only indirectly through top- and bottom-line performance (in which case, all firm value forecast deviations are attributable to the performance variables) or may have a direct effect beyond the performance impact For example, in the marketing context, Hanssens (1998) uses FEVD on channel orders and consumer demand data to show that sudden spikes in channel orders have no long-term consequences for the manufacturer, *unless* movements in consumer demand accompany them For a detailed overview of all VAR modeling steps, see the work of Enders (1995) and Dekimpe and Hanssens (1999)

Data Description

Our data come from four major sources JDPA for weekly sales and marketing, Center for Research in Security Prices (CRSP) and COMPUSTAT for firm performance, and I/B/E/S for earnings forecasts (Ittner and Larcker 1997) We describe these databases in turn and summarize our variable operationalization and data sources in Table 1

Marketing Databases: JDPA

Sales transaction data for a sample of dealerships in the major U S metropolitan areas are available from JDPA We use data containing every new-car sales transaction of a sample of 1100 California dealerships from October 1996 through December 2001 The detailed data for this region are representative of other U S regions, for which available data periods are shorter Each observation in the JDPA data contains the transaction date, manufacturer, model year, make, model, trim and other car information, transaction price, and sales promotions, which are operationalized as the monetary equivalent of all promotional incentives per vehicle All observations are retail transactions (i e , sales or leases to final consumers), excluding fleet sales[6] Moreover, the data set is at the detailed "vehicle" level, which is defined as every combination of model year, make, and model (e g , 1999 Honda Accord, 2000 Toyota Camry), body type (e g , convertible, coupe, hatchback), number of doors (e g , two door, four door, four-door extended cabin), trim level (e g , for Honda Accord, DX, EX, LX), drive train type (e g , two-wheel drive, four-wheel drive), transmission type (e g , automatic, manual), cylinders (e g , four cylinder, V6), and displacement (e g , 3 0 or 3 3 liters) (Morton, Zettelmeyer, and Silva-Risso 2001)

The vehicle information is aggregated to the brand level, which represents a company's presence in a certain category For example, Chevrolet, GMC, and Cadillac are the three General Motors brands in the SUV category

Another source of JDPA data is expert opinions on the innovation level of each vehicle redesign or introduction In line with JDPA (1998) guidelines, experts rate such innovativeness on the five-point scale presented in Table 2

Our innovation scale ranges from mere trimming and styling changes (Levels 1 and 2), to "design" and "new benefit" innovations (Levels 3 and 4), to brand entry in a new category (Level 5) For example, the 2002 Toyota 4Runner with minor exterior styling changes is a Level 1 car, the 1999 Ford Explorer with minor updates to interior and exterior is a Level 2 car, the 1998 Isuzu Rodeo with a major change to vehicle platform is a Level 3 car, the 2001 Ford Explorer with a new platform and additional "third-row" seating is a Level 4 car, and the 2001 Acura MDX is a Level 5 car We compared the JDPA classification with the scales used in previous automobile studies in the economics literature (Hoffer and Reilly 1982, Sherman and Hoffer 1971) Although all three approaches converge on most innovation levels, the JDPA scale is more informative in that it acknowledges the introduction of new consumer benefits and includes new brand entry (i e , the first time a brand enters an automobile category) Furthermore, when there

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[6] A major source of fleet sales is vehicles sold to rental car companies, which are often affiliated with or owned by a car manufacturer For this reason, the inclusion of fleet sales could contaminate our measures

TABLE 1
Measures, Operationalization, and Data Sources

Measure	VAR Variable	Endogeneity	Operationalization	Temporal Aggregation	Data Sources
Firm value	$VBR_{i,t}$	Endogenous	The ratio of firm i's market value to book value (defined as market value to book equity)	Weekly	CRSP
Top-line performance	$REV_{i,t}$	Endogenous	The revenues of firm i	Weekly (quarterly data allocated in proportion to the retail sales level in each week)	COMPUSTAT JDPA transactions
Bottom-line performance	$INC_{i,t}$	Endogenous	The earnings of firm i	Weekly (quarterly data allocated in proportion to the retail sales level in each week)	COMPUSTAT JDPA transactions
Product innovation	$NPI_{ijk,t}$	Endogenous	The brand innovation variable, defined at the brand level as the maximum of the innovation variable for all vehicle transactions for brand j in category k in a particular week	Weekly	JDPA expert opinion JDPA transactions
Sales promotions	$SPR_{ijk,t}$	Endogenous	The monetary equivalent of all promotional incentives for brand j in category k in a particular week	Weekly	JDPA transactions
S&P 500	$S\&P500_t$	Exogenous	The S&P 500 index	Weekly	CRSP
Construction cost index	$CONSTRUCT_t$	Exogenous	The construction cost index	Weekly	CRSP
Earnings forecasts	$EPS_{i,t}$	Exogenous	Quarterly earnings forecasts for firm i	Quarterly	I/B/E/S
Dollar–yen exchange rate	$Exchange_t$	Exogenous	The dollar–yen exchange rate	Weekly	Federal Reserve Foreign Exchange

TABLE 2
JDPA Expert Rating Scale on Innovation Level for Car Model Changes

Innovation Scale	Innovation Level Description
0	No visible change
1	Only styling changes that affect grille, headlight, and taillight areas
2	Minor changes that affect sheet metal in front and rear quarter areas and minor changes to interior but not the instrument panel
3	Major changes that affect exterior sheet metal and considerable change to interior, including instrument panel
4	All new sheet metal including the roof panel (e g , new platform, change from rear-wheel to front-wheel drive)
5	New entry into the market

are no visible changes between model years, the scale assigns an innovation value of zero[7] The expert ratings operationalize our new product introduction variable, which is timed at the moment of market launch

Because innovation is vehicle specific and we estimated our models by brand, the innovation variable needs to be converted to the brand level We define brand-level innovation as the maximum innovation level for all the brand's vehicle changes in the entry week[8] We consider 41 brands in six major product categories SUVs, minivans, midsize sedans, compact cars, compact pickups, and full-size pickups Table 3 shows that during the period of observation (October 1996 through December 2001), some of the categories experienced many major and minor new product introductions (SUVs and full-size pickups) or a dominance of major introductions (minivans) In other categories there was a more moderate amount of product innovation (midsize and compact cars), and still others were characterized mainly by minor product improvements (compact pickups)

Financial Databases: CRSP, COMPUSTAT, and I/B/E/S

Our measure of firm value is based on the comprehensive data set of firm market capitalization and daily market indexes (S&P 500) of the New York Stock Exchange, which we obtained from CRSP The CRSP database covers stocks traded on the major U S stock exchanges the New York Stock Exchange, the American Stock Exchange, and NASDAQ Following financial convention, we used Friday closing prices to compute weekly firm market capitalization (Mizik and Jacobson 2003)

For firm-specific information and quarterly accounting information, such as book value, revenues, and net income, we used S&P's 1999 COMPUSTAT database The quarterly variables of income and revenue are allocated to quarter weeks in proportion to the retail sales level generated in each week, as obtained from the JDPA database (i e , we assume that revenue and income generated in a given week are proportional to unit sales in that week) In addition, the COMPUSTAT database provides monthly indexes of the construction cost index and the consumer price index, which we used to deflate all monetary variables Finally, the I/B/E/S database provides analysts' quarterly earnings forecasts for the six major manufacturers in this study—Chrysler, Ford, General Motors, Honda, Nissan, and Toyota—which represent approximately 86% of the U S car market

Recall that our unit of analysis for the marketing variables is the brand level in each of six product categories Table 4 provides a listing of the brands in the study as well as the descriptive statistics for the measures that form the basis of our analysis A casual inspection of Table 4 does not reveal any obvious association between the number of major and minor new product introductions and the ratio of market capitalization to book value This relationship needs to be assessed longitudinally while controlling for exogenous factors that influence the general stock market and the specific industry, as in our VAR models

TABLE 3
New Product Introductions in Six Car Categories

Category	Major Innovations (Levels 3–5)	Minor Innovations (Levels 1–2)	Total
SUV	88	51	139
Minivan	24	4	28
Midsize sedan	21	16	37
Small cars	23	22	55
Compact pickup	19	29	48
Full-size pickup	70	32	112
Total	245	154	399

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[7] As we stated previously, we investigate only the launch of new or updated products (which may incorporate process innovations), not process innovations by themselves

[8] For example, if Toyota offers two redesigned SUV models in a particular week at Levels 1 and 3, the new product introduction variable has the value of 3 for the Toyota brand m the SUV category in that week

TABLE 4
Characteristics of the Six Leading Car Manufacturers (October 1996–December 2001)

Characteristics	Chrysler[a]	Ford	General Motors	Honda	Nissan	Toyota
	Dodge, Jeep, Chrysler	Ford, Lincoln	Chevrolet, Cadillac, GMC, Buick, Saturn	Honda, Acura	Nissan, Infiniti	Toyota, Lexus
Number of models	15	16	30	9	9	19
U S market share	15%	21%	28%	8%	4%	10%
Market capitalization ($ in millions)	48,310	52,475	41,770	36,100	15,360	119,140
Market capitalization to book value	1 91	2 36	1 90	2 29	1 51	2 16
Quarterly firm earnings ($ in millions)	845	1612	988	559	−108	1079
Quarterly firm revenue ($ in millions)	29,120	39,520	43,355	12,792	13,065	26,780
Number of major introductions (Levels 3–5)	38	77	64	23	15	28
Number of minor introductions (Levels 1–2)	29	36	29	19	9	28
Sales promotions per vehicle ($)	633	382	632	24	200	113

[a] We included Chrysler's merger into Daimler-Chrysler (October 1998) in the Chrysler VAR model by including dummy variables (for a similar treatment of exogenous variables, see Nijs et al 2001)

Results

The 41 estimated VAR models (one for each brand), with the number of lags indicated by the SBIC, showed good model fit (the R^2 ranges from 25 to 57, and the F-statistic ranges from 3 06 to 14 37)[9] We first review our results on the performance impact of new product introductions and sales promotions We then discuss how the effects emerge over time, and we demonstrate the interactions between new product introductions and promotions Finally, we examine the robustness of our findings across both categories and innovation levels

Impact of New Product Introductions on Financial Performance and Firm Value

Table 5 shows short-term (same-week) and long-term elasticities of brand-level product introductions and promotions on firm-level performance as sales-weighted averages over all 41 brands for six categories and six companies[10]

Because we relate total corporate performance to a new product introduction for one brand in one category, the reported elasticities are small, which is in line with previous research (Kelm, Narayanan, and Pinches 1995) but statistically significant Overall, new product introductions have a positive short- and long-term impact on the firm's top-line, bottom-line, and stock market performance Moreover, the impact persists over time

First, our firm revenue results confirm previous findings of strong sales effects of new product introductions, both in the car industry (Hoffer and Reilly 1984, Sherman and Hoffer 1971) and in other categories (e g , Booz Allen Hamilton 1982, Kashani, Miller, and Clayton 2000) Notably, we find that the top-line benefits materialize relatively quickly, in six to ten weeks, possibly because the automobile industry is product driven and its end users are highly involved in the category (Farr 2000, JDPA 2002)

Second, the bottom-line impact of new product introductions follows a similar pattern over time as the top-line impact but with lower elasticities This demonstrates the crucial importance of new product introduction costs in the industry This observation is consistent with Bayus and Putsis's (1999) research on product proliferation in the personal computer industry and thus may generalize to other industries with substantial innovation costs

Third, the average short-term firm value impact of new product introductions is low compared with the top- and bottom-line benefits An explanation for this finding is that

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[9] Detailed results are available on request from the first author

[10] We follow Pauwels, Hanssens, and Siddarth (2002) in adopting static weights (i e , average share across the sample) rather than dynamic (current-period) weights to compute the weighted prices

TABLE 5
Impact of Product Introduction and Rebates on Performance and Firm Value (Mean Values)

	New Product Introductions		Sales Promotions	
	Short Run	Long Run	Short Run	Long Run
Top-Line Performance				
Firm revenue	2 39	4 30	1 48	7 94
Bottom-Line Performance				
Firm income	37	60	1 09	−1 28
Firm Value				
Ratio of market capitalization to book value	02	1 14	12	− 78

Notes For readability, we multiplied elasticity estimates by 1000 investors have already incorporated the firm's product introduction into their valuation (e.g., Ittner and Larcker 1997). In contrast, the long-term firm value effects are typically higher, indicating that relevant new information unfolds as time progresses. Figure 1 illustrates the impact over time of new product introductions for the Honda Odyssey (minivan category) on the valuation of the Honda corporation. After a small initial (short-term) gain, the effect grows and stabilizes at its persistent (long-term) positive value in approximately two months.

Impact of Sales Promotions on Financial Performance and Firm Value

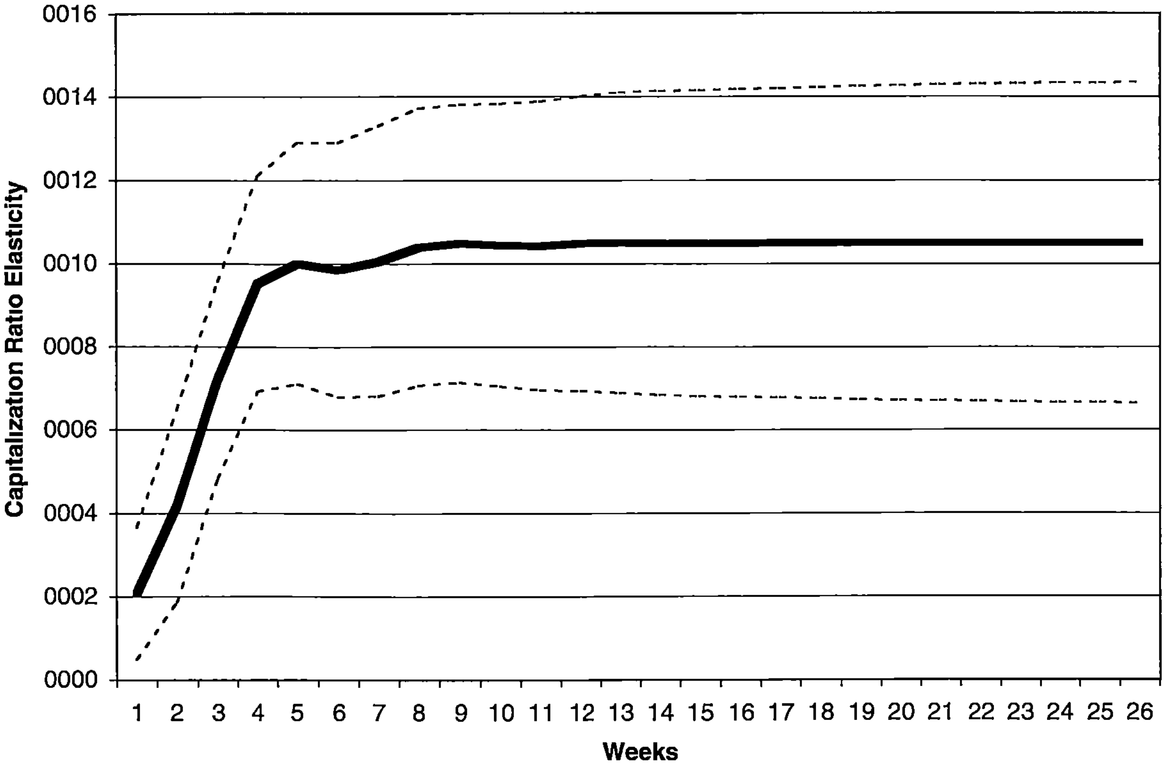
The effects of promotional programs on market and financial performance are significantly different from those of new product introductions. Table 5 shows that incentive programs have uniformly positive effects in the short run; top-line, bottom-line, and stock market performance all increase. In other words, investors' reaction mirrors consumers' reaction to incentive programs, which is strong, immediate, and positive (Blattberg, Briesch, and Fox 1995). However, the beneficial effects are short-lived for all but a firm's top-line performance, because both long-term bottom-line and firm value elasticities are negative. As we detailed in the validation analysis, this negative long-term elasticity represents most brands in our analysis.

A possible explanation for the sign switch in income and investor reaction between the short and long run is price inertia or habit formation in sales promotions. The short-term success of promotions makes it attractive for managers to continue using them (Krishna, Mela, and Urbany 2001; Srinivasan, Pauwels, and Nijs 2003). In addition, because promotions are known to stimulate consumer demand only temporarily (Srinivasan et al. 2004), they need to be repeated, lest the company is willing to sacrifice top-line performance. Although such repetitive use of incentives is able to maintain, and even grow, the initial revenue effects (which drives the positive long-term revenue elasticity), profit margins erode and bottom-line performance and firm value suffer in the long run (*The Wall Street Journal* 2002c). This dynamic behavior is the opposite of the positive feedback loop, or "virtuous cycle," for new product introductions for which positive consumer and investor reaction stimulate further new product introduction efforts (Kashani, Miller, and Clayton 2000).

Growing Importance of New Product Introductions for Firm Value

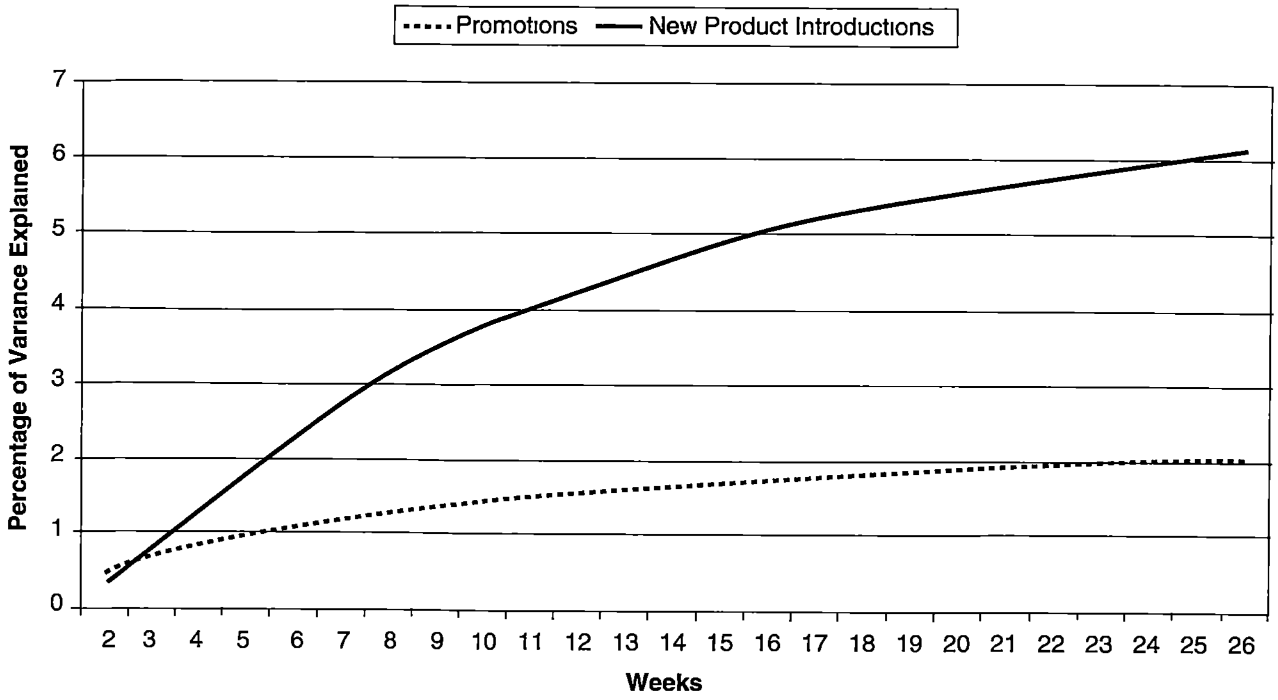
Because we find the firm value effects of new product introductions and promotions intriguing, we further investigate their importance in explaining firm value beyond their bottom-line effects. Figure 2 shows the FEVD results of

FIGURE 1
Elasticity over Time of Odyssey Introductions on Honda's Market-to-Book Ratio



Notes: We computed the market-to-book ratio as the impulse response of the log of the marketing variable to the log of the performance variable.

FIGURE 2
Market Capitalization FEVD



Notes Previous market-to-book ratio, income, and revenue account for the remaining variance

firm value, accounting for all performance and marketing variables

Although sales promotions initially are more important, an increasing percentage of the forecast deviation variance in firm value is attributed to new product introductions On average, the ability of product introduction to explain firm value forecast deviations is eight times greater after two quarters than it is in the week of product launch

Together with the increasing elasticity findings that are illustrated in Figure 1, this result pattern implies that new product introduction per se is a fairly high-entropy signal to investors Although investors' immediate reactions are not strong, they gradually adjust their reactions as emerging consumer acceptance information helps them update their expectations (Kelm, Narayanan, and Pinches 1995)[11] Moreover, the demonstrated direct effect of new product introductions on firm value implies that investors consider more than only current bottom-line effects In other words, investors reward firm innovativeness in the form of a premium in firm valuation beyond the new product's impact on top- and bottom-line performance This finding implies that investors show foresight beyond the extrapolation of firm profits For example, they may reward the spillover benefits of successful introductions on the manufacturer's image and reputation (Sherman and Hoffer 1971), possibly expecting that the image will enhance consumers' acceptance of the firm's future new product introductions

Interactions Between New Product Introductions and Promotional Incentives

Because new product introductions and promotional incentives have such different long-term effects on firm value, we investigate their interaction in firms' decision making We capture the dynamic interactions by examining the impulse response of promotional incentives to new product introductions (see Table 6)

TABLE 6
Number of Brands with Negative Interactions Between Marketing Actions

	Short Run	Long Run
SUV	58%	58%
Minivan	67%	75%
Premium midsize	50%	75%
Premium compact	36%	78%
Compact pickup	20%	60%
Full-size pickup	62%	75%

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[11] The emerging consumer acceptance information about the new product could include factors such as vehicle sales, days-to-turn, product reviews, advertising efforts, and consumer awareness The determination of the exact nature of this information is beyond the scope of this study

Notably, new product introductions have a negative and persistent impact on the use of incentives. Because sales promotions are long-term value deterrents (per our previous finding), this finding supports the important strategic conclusion that a policy of aggressive new product introductions is an antidote for excessive reliance on consumer incentives. For example, consider the major redesign of the Honda Odyssey in 1999. The new design had a persistent, beneficial effect on the margins for the vehicle, which continues to enjoy strong sales without virtually any promotional incentives (White 2001).

Robustness of Results Across Product Categories and Innovation Levels

Finally, we assess the robustness of our findings across product categories and innovation levels. First, are the short- and long-term firm value effects of new product introductions and promotional incentives robust across product categories? Table 7 shows the frequency of positive stock market performance effects of new product introductions for the 41 brands in our analysis.

The short-term firm value effects show both negative and positive values across categories, in support of our interpretation that new product introductions are high-entropy signals to investors. Still, the short-term effects of new product introductions are positive for the most part; no product category shows a dominance of negative effects. The long-term effects of new product introductions show a predominantly positive effect on firm value in each of the six categories. Over the total sample, new product introductions have a positive, long-term impact on market capitalization for 81% of all brands.

The short-term effects of promotion incentives vary among categories. SUVs, minivans, and premium midsize cars show a negative impact, and premium compact cars, compact pickups, and full-size pickups show a positive impact. Overall, half of all brands show positive short-term promotion effects. In the long run, this is true for only 43% of the brands.

Second, does the general pattern of our findings hold across innovation levels? To answer this question, we reestimate our model for each brand and substitute the introduction variable by variables that measure each innovation level.[12] Table 8 shows the detailed breakdown of the performance impact of styling changes only (Level 1), minor sheet-metal changes (Level 2), major sheet-metal changes (Level 3), all new sheet metal and/or new platform (Level 4), and new market entry (Level 5).

Consistent with the new product literature (Cooper and Kleinschmidt 1993; Holak and Lehmann 1990; Montoya-Weiss and Calantone 1994), we observe an almost linear relationship between the innovation level and its short-term revenue impact. Long-term revenue performance follows a similar pattern, with low impact for mere trim changes and high impact for new market entries; however, there is little difference among the intermediate innovation levels.

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[12] Because our innovation variables are not continuous, we validate our VAR results by estimating ordered probit models for the five-point innovation scale and probit models for the five innovation-level dummy variables. Comparison of the probit coefficients with the VAR innovation equations yields high correlations (.78 for the major/minor innovation models and .87 for the five-point innovation scale models). We conclude that our main results are robust to the nature of the innovation scale.

TABLE 7
Percentage of Brands with Positive Firm Value Elasticity

	New Product Introduction		Promotional Incentives	
Category	Short Run	Long Run	Short Run	Long Run
SUV	58%	92%	42%	50%
Minivan	67%	100%	17%	17%
Premium midsize	67%	83%	17%	17%
Premium compact	71%	57%	86%	57%
Compact pickup	80%	80%	60%	40%
Full-size pickup	50%	75%	75%	75%
Average	66%	81%	50%	43%

TABLE 8
Performance Impact of Introduction Levels (Mean)

New Product Introductions	Level 1	Level 2	Level 3	Level 4	Level 5
Revenue short-term impact	2.47	3.04	3.27	4.67	6.02
Revenue long-term impact	2.32	6.83	5.65	5.68	10.45
Income short-term impact	.70	.38	.35	.88	2.09
Income long-term impact	.41	2.61	–.40	–4.99	.69
Firm value short-term impact	–.01	1.27	–.45	–1.06	1.19
Firm value long-term impact	1.84	1.53	.87	–2.31	3.46

Notes: For readability, we multiplied elasticity estimates by 1000.

The results for bottom-line performance are more complex The short-term impact on income has a U-shaped relationship with innovation level Partial sheet-metal changes (Levels 2 and 3) have a lower income impact than mere styling changes, whereas major updates and especially new brand entries yield the greatest income benefits In the long run, we even observe negative average income effects for Levels 3 and 4 The results reflect and extend previous findings of negative financial returns on new-car models (Sherman and Hoffer 1971) and demonstrate the crucial importance of new product introduction costs in the auto industry

Finally, the stock market performance impact has a similar U-shaped relationship with innovation level, but there is a preference for new market entries over minor updates The results again support our interpretation that investors consider more than only current financial returns, such as spillover innovation benefits in the more distant future, which may include a manufacturer's improved image, increased revenues from the opening of new markets, and reduced costs from applying the innovation technology to different vehicles in the fleet (Sherman and Hoffer 1971) Indeed, Booz Allen Hamilton (1982) argues that new-to-the-world products and new product lines (Level 5) offer the highest benefit potential but face manager reluctance because they also pose a major risk compared with incremental innovations Therefore, investors appear to appreciate new market entries as a signal of confident and bold management

Implications

Our central result is that beyond the impact of the firm's earnings and the general investment climate, product introductions have positive and increasing effects on firm value In contrast, sales promotions diminish long-term firm value, even though they have positive effects on revenues and (in the short run) on profits Thus, the investor community rewards new product introductions and punishes discounting beyond the readily observable financial performance of the firm Table 9 summarizes these findings

Are the reported elasticities economically relevant? Table 10 reports the size of the monetary effects on market capitalization in dollars[13] New product introductions typically generate tens of millions of dollars of long-term firm value, and often several hundred million dollars (up to $302 million) The reverse is true for promotions, which subtract tens or even hundreds of millions of dollars of firm value, or up to $324 million in our calculations These amounts are especially great given that both product introduction and

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[13] We derive the dollar metric of incremental impact on market capitalization using the estimated elasticities and the end-of-the-observation-period values of the brand's marketing variables (innovation level and rebate) and ratio of market capitalization to book value (Dekimpe and Hanssens 1999, Note 11)

TABLE 9
Summary of Findings

Impact of . .	Short Run	Long Run
New product Introductions on top-line performance	+	++
New product Introductions on bottom-line performance	+	++
New product Introductions on firm value	+	++
Promotions on top-line performance	+	++
Promotions on bottom-line performance	+	–
Promotions on firm value	+	–
New product introductions on the use of promotions	–	–

Notes + = significant, positive impact, – = significant, negative impact, ++ = intensified positive impact

TABLE 10
Monetary Impact of New Product Introductions and Rebates on Firm Value

	Chrysler	Ford	GM	Honda	Nissan	Toyota
New Product Introductions						
SUV	302	65	49	102	201	200
Minivan	36	34	36	32	2	184
Midsize sedan	34	10	132	7	4	154
Small cars	115	30	59	60	–29	73
Compact pickup	17	58	138	—	32	25
Full-size pickup	47	41	13	—	—	259
Rebates						
SUV	–148	–26	–72	–36	–39	–92
Minivan	–200	–64	–67	–37	–44	–24
Midsize sedan	–45	–324	–32	–25	–7	–91
Small cars	–64	–58	–24	35	28	37
Compact pickup	–65	–43	–93	—	32	61
Full-size pickup	–157	–20	–76	—	—	–35

Notes Median impact is in millions of dollars sales promotions are not isolated events in the auto industry. They occur relatively frequently and, as such, can account for substantial up- or downward movement in auto companies' stock prices.

Our results in Table 10 highlight the differences across firms and categories and can be related to firms' product strategies and category growth trends. For example, from 1996 to 2001, Ford experienced a shift in emphasis from quality of manufacturing to customer service and cost reductions, under the leadership of its CEO Jack Nasser. The former included service improvements offered by the dealers and improvements in the interface to the consumers through ventures such as Ford Direct. Ford achieved cost reductions through price discounts from its suppliers and manufacturing-related cost savings. In contrast, Chrysler (through its design chief Bob Lutz) was emphasizing innovative, appealing design during this period. For example, Chrysler introduced the highly successful Dodge Durango and Jeep Liberty in the SUV category and the PT Cruiser in the small-cars category. Our results in Table 10 indeed reflect the success of Chrysler's innovation-focused product strategy compared with that of Ford. Chrysler has greater positive effects of new product introductions on firm value than does Ford in all but one category.

For category trends, the SUV category, for example, experienced 12.3% annual growth from 1996 to 2001, whereas the small and midsize sedan categories decreased by 1% and 6% annually, respectively. Our results in Table 10 reflect the market trends because the high-growth SUV category typically has greater effects of new product introductions than do the other lower-growth auto categories.

Our findings have several important implications for new product and promotion strategies. First, to boost the long-term market capitalization of their companies, executives should focus on new product introductions and resist relying on sales promotions. Although consumer incentives may yield increased short-term performance and/or prevent severe sales erosion while new product projects are in the pipeline, they do not provide a viable long-term answer to the manufacturer's challenges in the industry (*The Wall Street Journal* 2002c).

Second, although in the short run investors often view product introduction favorably, their reactions unfold over time, so market acceptance of the introduction is an important component in determining its long-term impact on firm value. This finding supports the idea that innovative firms need to pay special attention to appropriating new product introduction rewards in the marketplace to enhance stock returns (Kelm, Narayanan, and Pinches 1995; Mizik and Jacobson 2003; Pardue, Higgins, and Biggart 2000). In this regard, investors most value entries into new markets (i.e., Level 5).

Third, managers need not always incur the high development and launch costs that are associated with major product innovations. Indeed, the U-shaped relationship between innovation level and long-term firm valuation implies that firms can benefit from "pulsing" innovations (i.e., provide minor improvements to their new market entries rather than engage in continuous intermediate-level innovation). This finding corroborates the argument in favor of fast new product development and launch, followed by fine-tuning the product on the basis of market feedback (Smith and Reinertsen 1991). A recent study of many categories indicates that "incremental innovations can be drivers of brand growth in their own right" if they represent additional consumer benefits and are introduced more frequently than competitor products (Kashani 2003, p. 57). As a case in point, consider Ford's decision to return Lincoln to profitability based on relatively minor changes with lower development costs (aimed to position Lincoln as an "American luxury" brand), instead of making the major leap toward a global luxury brand at substantially higher costs (*The Wall Street Journal* 2002b). This move is "quite possibly exactly what Lincoln's customers—and Ford investors—would prefer" (*The Wall Street Journal* 2002b, p. B4).

This study has some limitations that provide worthwhile avenues for further research. First, although our data period (1996–2001) is substantial, it covers only a fraction of the history of the automobile industry and does not feature major innovations that occurred before 1996. Indeed, important breakthroughs and new-to-the-world products, such as four-wheel traction and minivans, may receive considerably greater long-term benefits than even the new market entries in our data period. In the same vein, we focused on new product introductions and did not examine process innovations. Second, we analyzed only one industry, albeit one in which new product introductions and sales promotions play a major role in marketing strategy. A validation of our results in other industries is an important area for further research. Third, this research has assessed the average performance impact of new product introductions, but it leaves the explanations of differences in effects across firms and categories for further studies. Moreover, additional work could address the importance of the relative innovativeness of a company compared with competitive offerings in explaining the observed performance results. Finally, researchers might investigate consumer acceptance ratings that are available before launch and thus may help predict the performance impact of specific introductions. Likewise, knowledge of when management realizes the failure of a new product introduction may shed light on managerial action to remedy the situation, including either more new products or more promotions.

In conclusion, the marketing literature to date has provided several insights into the benefits and risks of new product introductions for consumers and firms. Our research adds an important dimension. The investor community rewards innovative firms by their willingness to pay a premium in valuation, and this premium gradually increases for several weeks after the new product launch. Furthermore, innovation policy is an antidote against firms' dependence on sales promotions, which depress firm value. In the words of General Motors' chief financial officer, John Devine (JDPA 2002a, p. 1), "in terms of driving profits in the [United States], it's about getting products right."

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Strategic Responses to New Technologies and Their Impact on Firm Performance

Modern corporations must adopt and assimilate new technologies to build and sustain competitive advantage. The authors develop a theoretical framework to understand the relationships among (1) strategic responses to new technologies, (2) organizational resources, and (3) firm performance. Specifically, they theorize that a strategic response can be categorized according to the dimensions of magnitude, domain, and speed, and they conceptualize organizational resources as tangible and intangible. The authors operationalize this framework for the adoption of the Internet by traditional store-based retailers, for which they posit strategic responses as the speed of (1) adopting the Internet as a communications channel, (2) adopting the Internet as a sales channel, and (3) forming e-alliances. In addition, they use resource slack to represent organizational resources. Results from nine years (1992–2000) of data on 106 firms establish the influence of strategic responses on firm performance (i.e., market valuation of the firm, operationalized as Tobin's q). Specifically, the results show that both the adoption of the Internet as a communications channel and e-alliance formation positively influence firm performance. The positive effect of communications channel adoption on firm performance is enhanced further by the use of slack resources. *Post hoc* analysis reveals that the adoption of the Internet as a sales channel seems to matter only to firms that have preexisting catalog operations.

As new technologies become ubiquitous, firms must adopt and assimilate them to gain and sustain competitive advantage (e.g., Abernathy and Utterback 1978; Tushman and Anderson 1986). Recent examples—such as the adoptions of biotechnology by pharmaceutical firms, semiconductors by machine tools firms, video banking by commercial banks (Pennings and Harianto 1992), and information technology (IT) by a diverse set of firms such as small office professionals (Kim, Han, and Srivastava 2002) and market makers (Grewal, Comer, and Mehta 2001)—illustrate the importance of this organizational phenomenon. Although the literature has focused on strategic responses to competitive threats (Heil and Robertson 1991), theoretical developments and empirical investigations of strategic responses to new technologies have been lacking.

As a result of inherent differences in organizational routines (Nelson and Winter 1982), business processes (Srivastava, Shervani, and Fahey 1999), and resources (Wernerfelt 1984), firms are expected to differ in their strategic responses to new technologies. Organizational routines and business processes are likely to determine the efficacy of resources while the firm adopts and assimilates new technologies. Therefore, firm differences in strategic responses to new technologies and firm resources should result in performance heterogeneity (Rumelt 1974). Thus, it becomes important to understand (1) the impact of strategic responses on firm performance and (2) the role of organizational resources in the relationship between the strategic responses and firm performance. To address these research questions and to understand the relationships among strategic responses to new technologies, organizational resources, and firm performance, we theorize about strategic responses along the dimensions of magnitude, domain, and speed (Heil and Robertson 1991), and we posit that organizational resources consist of tangible and intangible resources (Barney 1991).

The intensity of the organizational response to a new technology represents the response magnitude. At the extremes, firms may decide either not to adopt the new technology or to reengineer their business processes to assimilate the new technology (e.g., Gatignon, Anderson, and Helsen 1989). Midrange responses are also possible, in which firms adopt a technology on an experimental basis. In addition to the intensity of response, firms may differ in the business process (response domain) that they decide to alter to adopt the new technology (Srivastava, Shervani, and Fahey 1999). For example, one firm may use advances in communications technology to revamp its logistics activities, another may use the same technology to streamline customer relationship management (CRM). Finally, the speed with which firms adopt the new technology may vary across firms, and timely responses should enable them to gain early-mover advantages (e.g., Lieberman and Mont-

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gomery 1988) By combining these three dimensions, we capture a firm's strategic response

Firms are likely to use their resources to implement their strategic responses to new technologies Resources include both tangible and intangible organizational assets, such as managerial skills and know-how, organizational processes and routines, market-based assets, human assets, and financial assets such as cash (e g , Hunt and Morgan 1995, Srivastava, Shervani, and Fahey 1998), that are valuable, rare, inimitable, and nonsubstitutable (Barney 1991) Resources are the products of a firm's history and the outcomes of its prior strategic actions (Barney 2001) The endowments of such resources affect a firm's competitive position and its ability to generate economic rents (Rumelt 1974) We suggest that resources help determine the efficacy of strategic responses to new technologies

To test this framework empirically, we need a context (industrial sector) in which (1) a new technology has had widespread influence, (2) there are differences in strategic responses to this new technology, and (3) there are differences in organizational resources Internet technology for retailers represents such a case Internet technology has had a widespread impact on retailing, to the extent that some researchers even predicted that the Internet would lead to the demise of traditional retailing (e g , Chen and Leteney 2000) Strategic responses to the Internet vary significantly across retailers, for example, some retailers (e g , Best Buy) formed alliances with IT firms, whereas others did not (e g , Gottschalks), some adopted early (e g , Wal-Mart), whereas others were slow (e g , Jacobson Stores), and some had catalog operations (e g , J C Penney), whereas others did not (e g , May Department Stores) Finally, retailers differ significantly in the amount of resources they own, and some firms (e g , Wal-Mart) have more than others (e g , Good Guys)

Our research makes several important theoretical and managerial contributions As we elaborate subsequently, it highlights the importance of strategic responses and organizational resources during the assimilation of new technology We develop a typology of strategic responses to new technologies and demonstrate its efficacy Furthermore, we provide secondary data-based measures to assess strategic responses and organizational resources, which then can be used to design longitudinal studies for various strategic marketing issues With Tobin's q as the measure of firm performance, we also contribute to the understanding of the drivers that create shareholder wealth (e g , Day and Fahey 1988, Srivastava, Shervani, and Fahey 1998) For managers, this research helps uncover the impact of their responses to new technologies

Conceptual Background

The three components of strategic responses—magnitude, domain, and speed—suggest that a response is likely to include one or more of the three components (thus, the overlapping circles in Figure 1) Response magnitude, or the intensity of a firm's response to new technology, can be assigned to a spectrum whose endpoints represent ignoring the new technology or assimilating it completely Closer to the lower end of the spectrum, firms can adopt the technology on an experimental basis to "test the waters" and learn about the technology (Dickson 1992) At relatively higher levels, firms may decide to adopt the technology as a backup, viable alternative, or complement to their existing technology Response magnitude also might be measured according to money spent or number of employees involved with a task, after controlling for firm size and other confounding variables

Response domain pertains to the business process, such as supply chain management, new product development, or CRM, that is affected by the new technology (e g , Srivastava, Shervani, and Fahey 1999) Response domain can be conceptualized in terms of organizational routines, in the sense that routines represent "all regular and predictable behavioral patterns of firms" (Nelson and Winter 1982, p 14) For example, a loyalty management program (e.g., frequent shopper program), which is a component of a larger CRM process, can be viewed as a routine and thus as a possible domain of responses to new technologies

Response speed represents the timeliness of the response, in that faster responses can preempt competitive actions and provide the firm with greater opportunities to learn the benefits of the new technology (Lieberman and Montgomery 1988, 1998) First-mover advantage arises when learning curves generate barriers to the entry of other firms (Robinson 1988, Spence 1981), and it enables the first mover to preempt scarce assets, such as physical resources (e g , Robinson and Fornell 1985, Schmalensee 1978), and shape consumer preferences, which lead to high switching costs (Carpenter and Nakamoto 1989, Grewal, Cline, and Davies 2003) Speed also has been shown to be vital for diverse strategic issues, including introducing new products, entering new markets, and responding to competitive threats (e g , Bayus, Jain, and Rao 1997, Bowman and Gatignon 1995, Kerin, Varadarajan, and Peterson 1992) Thus, we expect that firms that respond to a new technology more quickly than their rivals will be able to garner first-mover advantage [1]

Most responses to new technologies are likely to encompass two or more of the three response components For example, although the prototype of an industrial robot was developed in the United States in the 1950s and its first commercial use was by a U S firm in 1961, it was Japanese automakers who adopted the technology en masse Thus, the advantage went to the Japanese, whose slower speed

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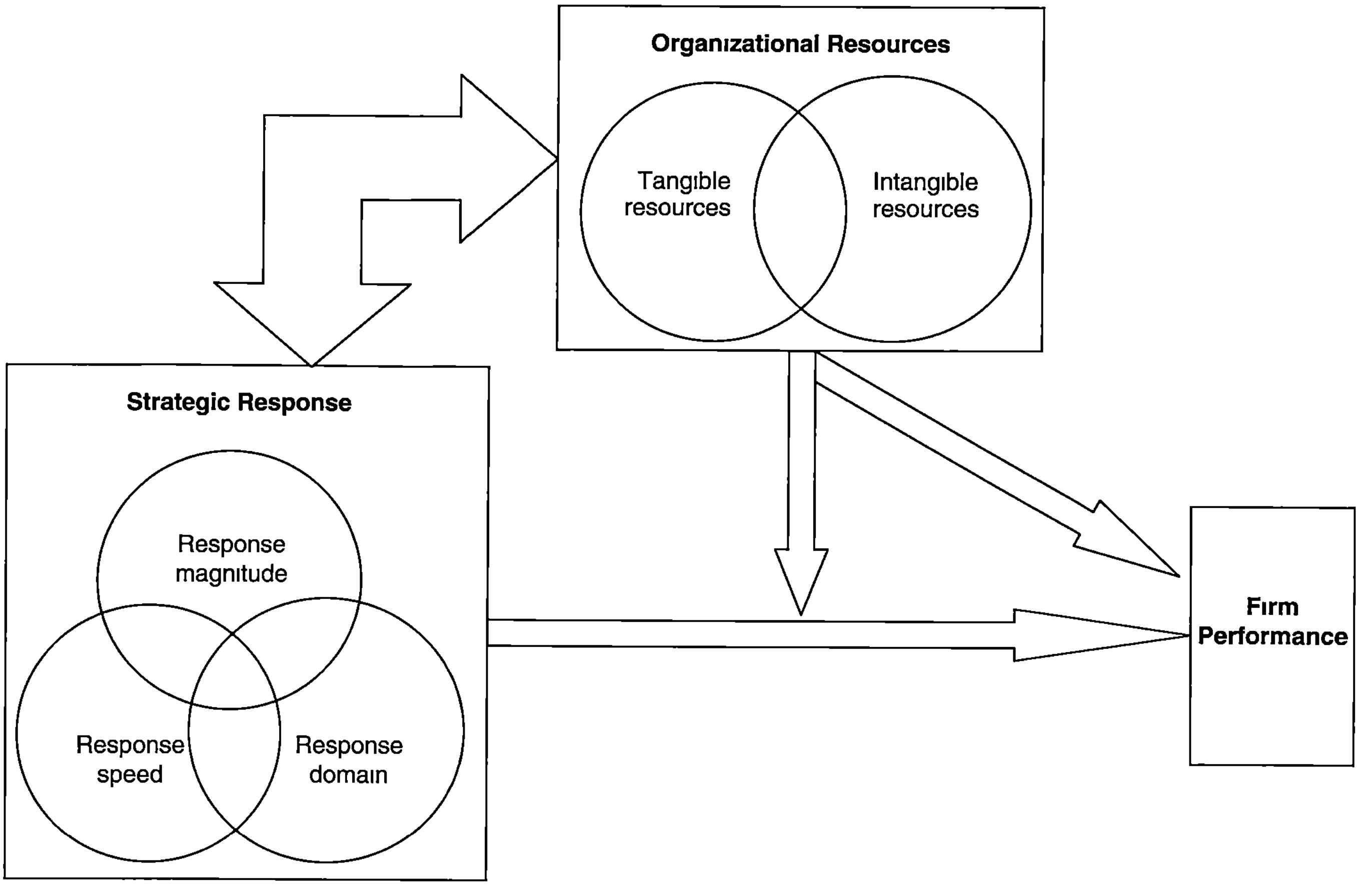
[1] Some researchers have found that first-mover advantage does not always pay off and that motivated late movers become winners (e g , Golder and Tellis 1993, Shankar, Carpenter, and Krishnamurthi 1998, for more details, see Tellis and Golder 2001) Lieberman and Montgomery (1988) discuss first-mover disadvantage and suggest that late movers (1) can free ride on early movers, (2) can gain from the resolution of technological and market uncertainty, (3) can jump to reliable technologies, and (4) are less likely to succumb to incumbent inertia Nonetheless, Lieberman and Montgomery's synthesis of literature on first-mover advantage shows more support for first movers than for late movers Lieberman and Montgomery question Golder and Tellis's (1993) operationalization of first movers and recognize that innovative late movers can be more successful than first movers

FIGURE 1

Conceptual Framework



was overcome by their higher magnitude and different domain application of the new technology (Tanzer and Simon 1990) Similarly, firms that adopted electronic markets early and expended considerable efforts to learn about the new medium were able to use it successfully as an alternative sales channel (Grewal, Comer, and Mehta 2001) Thus, according to existing research, various strategic options can be derived from any combination of response magnitude, domain, and speed

Research Model

To test the conceptual framework (Figure 1), we apply it to the strategic responses of store-based retailers to the advent of the Internet To be successful, store-based retailers must build knowledge and capabilities with regard to store and merchandise management, which are useful in designing store layouts, controlling traffic flow inside a store, and managing and maintaining the quality of in-store customer services, among other benefits However, with the emergence of the Internet, store-based retailers needed to develop new capabilities to execute online retail operations (Amit and Zott 2001) Specifically, online retailing requires IT capabilities to maintain a Web interface that is linked to back-end order-processing systems, logistics management systems, and strategic decision support systems Online retailers also must develop or acquire logistic management capabilities to complete an order by ensuring timely physical delivery to the homes of individual consumers, compared with traditional retailers, which need logistic capabilities to ensure in-store product availability[2] This disparity in capabilities makes Internet adoption a consequential decision Furthermore, as we reason subsequently, Internet adoption involves diversity in response magnitude, domain, and speed across firms The diversity in the response components and the strategic importance of Internet adoption make the advent of the Internet for the retail industry an appropriate setting to study the relationships among strategic responses, organizational resources, and firm performance (see Figure 2)[3]

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[2] The mismatch of capabilities between store-based and online retailing is amply illustrated by the case of Toys "R" Us Somewhat surprised by the sudden emergence and gain in prominence of eToys com, Toys "R" Us hurriedly launched its e-commerce operations Poor navigability and technical glitches highlighted the company's dearth of IT capabilities, and its inability to physically deliver products on time (i e , promised Christmas Day delivery) raised questions about its logistics capabilities (*The Economist* 2000) In contrast, the success of some traditional retailers, such as J C Penney, in online ventures underscores the promise of this new medium for store-based retailers

Strategic Responses

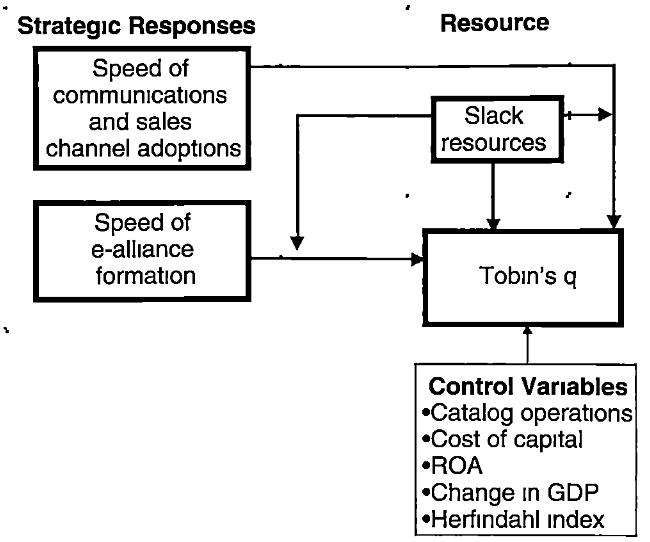
A traditional retailer may adopt the Internet as a communications channel, whereas another may adopt it as a sales channel As a communications channel, the Internet conveys information about products and store locations to consumers and information about finances to investors and shareholders To use the Internet as a sales channel, retailers must develop online order-taking capabilities and build logistic capabilities to ensure the timely delivery of products Thus, the adoption of the Internet as a sales channel represents a response of greater magnitude (i e , it involves greater investments) than its adoption as a communications channel Furthermore, communications and sales channels involve different business processes and therefore represent responses from different domains In addition to communications and sales channel adoption, firms may respond to new technologies by forming e-alliances E-alliances are strategic alliances that traditional retailers (e g , Best Buy, Wal-Mart) form with IT firms (e g , America Online [AOL], Microsoft) to acquire surrogate capabilities that facilitate information management, online transactions, and invoicing, among other things To incorporate response speed, we theorize the responses as the speed of (1) communications channel adoption, (2) sales channel adoption, and (3) e-alliance formation[4]

Communications/sales channel Retailers that adopt the Internet as a communications channel can use it to convey company information, which represents an initial step in which a retailer learns about the new technology before adopting it as a sales channel Sales channel adoption enables the retailer to provide its customers with an alternative to physical stores and thereby goes beyond communications channel adoption with its emphasis on generating sales (Burn, Marshall, and Wild 1999)

Although adoption of the Internet seems important, we believe that it is critical to adopt the new technology in a timely manner Consistent with extant literature that documents the importance of speed in strategic responses (Kerin, Varadarajan, and Peterson 1992, Lieberman and Montgomery 1988), we expect that the speed with which retailers adopt the Internet as a communications and/or sales channel will have a positive effect on their performance

E-alliances By forming alliances with IT-capable firms, retailers can draw on the IT expertise of their partners For example, Barnes & Noble partnered with AOL to market its Web site and to keep abreast of changes in the virtual world, and Best Buy allied with Microsoft for similar purposes

FIGURE 2
Researach Model for the Adoption of the Internet



Diverse theoretical perspectives imply the advantages of such alliances Transaction cost economics suggests that the alliances should help retailers reduce transaction costs (Gulati 1995), and organizational learning theory suggests that the alliances provide retailers with knowledge bases that they may lack (Parkhe 1993) Alliances should enable retailers to expand their resource bases and to help build competitive advantage by reducing risks, generating scale economies, and facilitating cooperation in the development of production and technological know-how (e g , Sivadas and Dwyer 2000, Varadarajan and Cunningham 1995)

In contrast, resource dependence theorists argue that alliances may create asymmetrical resource situations between partners, which can lead to adverse performance outcomes (Pfeffer and Salancik 1978) For example, Das, Sen, and Sengupta (1998) find that firms receive a smaller share of an alliance "pie" when they rely on their partners for technological know-how The literature on strategic alliances also cautions about the significance of bandwagon effects, which occur when firms form alliances simply because other firms are doing so Such motivation for forming alliances usually affects firm performance negatively, because the alliances are formed primarily to meet legitimacy needs, not to achieve efficiency Thus, whether e-alliances benefit retailers remains an open empirical question

Organizational Resources

Consistent with extant literature (Bourgeois 1981, Gatignon, Weitz, and Bansal 1990), we use the amount of slack resources that a firm possesses to assess organizational resources Slack resources are the buffer of idle resources that enables firms to be flexible and improvise (Grewal and Tansuhaj 2001, Moorman and Miner 1998) We suggest that these idle bundles of resources enhance a firm's ability to assess, adopt, and assimilate new technologies

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[3] We use Tobin's q, a forward-looking measure (e g , Anderson, Fornell, and Mazvancheryl 2004), to operationalize firm performance Because the formula for Tobin's q contains share price, we refer to this measure as reflecting the market valuation of the firm Thus, we use firm performance, market valuation of the firm, and Tobin's q interchangeably

[4] Another possible theoretical response is the integration of store-based and online operations However, this response is empirically correlated with the speed of adoption of the Internet as a sales channel, and therefore we do not use it

Nevertheless, slack resources have opportunity costs associated with them, in that *ex post* unused resources would have been productively used (Nohria and Gulati 1996) Thus, if slack resources are unused, they could have negative impacts on the firm As opportunity cost reasoning suggests, as the level of resource slack increases, its marginal utility decreases Thus, we include both linear and squared resource slack terms in our model to capture the diminishing marginal returns

Strategic Response and Organizational Resources

Slack resources instill flexibility in firms, which enables them to respond to environmental opportunities and threats (Bourgeois 1981, Nohria and Gulati 1996) The adoption of the Internet as a communications channel is such a situation, in which firms use the Internet to supplement and/or substitute for the communication they previously carried out through traditional channels Given that the economic benefits of Internet communications are well documented (e g , Rayport and Jaworski 2001), the deployment of slack resources for adopting the Internet as a communications channel should prove beneficial for retailers

The adoption of the Internet as a sales channel requires retailers to develop knowledge in previously unexplored domains Slack resources thus offer store-based retailers the ability to study the new capabilities needed and to expend efforts to acquire or develop the capabilities (e g , on-time delivery, effectively linked Web interface) Because online trade is fairly recent, it is difficult for many firms to understand its underlying cause-and-effect relationships Firms with slack resources may display greater abilities to absorb and use new information, which thereby makes it easier for them to assimilate new technologies (Zahra and George 2002) and to uncover causal ambiguities (Reed and DeFillippi 1990)

Control Variables

It is important to account for firm-, industry-, and economy-specific variables, because the market valuation of a firm (Tobin's q) can depend on these factors We use catalog operations, cost of capital, and return on assets (ROA) to control for firm-specific effects, the Herfindahl index to control for industry-specific (competitive) effects, and changes in the gross domestic product (GDP) to control for the volatility of the economy Firms with catalog operations, such as J C Penney, already had logistic systems in place to deliver products to the homes of individual consumers Because developing such a logistic management capability is necessary for successful online sales, it becomes important to account for catalog operations The cost of capital indicates the average interest rate that a firm pays for its long-term liabilities (Dutta, Narasimhan, and Rajiv 1999) Capital usually comes from two sources equity and debt The nature of these two sources of equity is quite distinct, and their effects need to be considered Regardless of profits or losses, firms must pay interest on liabilities However, when losses are reported, the firms need not pay dividends on equity We also account for ROA, which indicates the profitability of a business Because a firm's current profitability is likely to affect its market valuation positively, it is important to account for this link Profitability also depends on competitive intensity Thus, we include the Herfindahl index as a control variable that accounts for industry-specific competitive effects Finally, because we are conducting a longitudinal study, we must control for changes in the economy We use the change in the GDP to achieve this control

Thus, we present our research model in Figure 2 and Equations 1 and 2

$$(1)\quad Q = \beta_0 + \beta_1 \times SCC + \beta_2 \times SSC + \beta_3 \times SECA + \beta_{4i} \times RS + \beta_5 \times CAT + \beta_6 \times CC + \beta_7 \times ROA + \beta_8 \times GDP + \beta_9 \times HERF + \varepsilon_{it}, \text{ and}$$

$$(2)\quad \beta_{4i} = \gamma_0 + \gamma_1 \times RS + \gamma_2 \times SCC + \gamma_3 \times SSC,$$

where β and γ represent the effects of hypothesized and control variables, Q stands for Tobin's q, and SCC, SSC, SECA, RS, CAT, CC, ROA, GDP, and HERF stand for speed of communications channel adoption, speed of sales channel adoption, speed of e-alliance formation, resource slack, catalog operations, cost of capital, return on assets, changes in gross domestic product, and the Herfindahl index, respectively We expect β_1, β_2, γ_0, γ_2, and γ_3 to be positive and γ_1 to be negative We are unsure of the direction of β_3

Research Method

Data Sources

Because commercial use of the Internet began in 1994, we decided to study the nine-year period from 1992 to 2000 to capture the evolutionary effects of resource slack and strategic responses before and after the advent of the new technology We drew the sample of traditional retailers for this study primarily from the COMPUSTAT database and supplemented it with other sources The COMPUSTAT database for Standard Industrial Classification (SIC) codes 53 (general merchandise), 54 (food stores), 56 (apparel and accessories), 57 (home furniture and furnishings), and 59 (miscellaneous) consists of 259 retailers However, the database does not provide complete data for each of the retailers because (1) some retailers went out of business during that period (e g , County Seat Stores), (2) a few retailers were acquired by other organizations (e g , in 1998, Fred Meyer Inc acquired Food 4 Less Holdings), and (3) new retail organizations were formed during the period (e g , Amazon com) For other missing data, we searched sources such as Compact Disclosure, EDGAR, Standard and Poor's industry reports, and company annual reports We made every possible effort to obtain complete data for the nine-year period on all retailers

Furthermore, to derive Tobin's q (our measure of firm performance), we needed to know the closing share prices and preferred share values, which we obtained from the Center for Research in Security Prices (CRSP) tapes Inadequacies in the CRSP database, similar to those of the COM-

PUSTAT database, further reduced the sample size Because our research questions center on the efficacy of traditional retailers' strategic responses, we omitted retailers that employed only online operations (e g , Amazon com) Ultimately, we obtained complete data on 83 retailers that adopted the Internet between 1994 and 2000 We also obtained complete data on an additional 23 retailers that had not adopted the Internet during the period of our study Thus, the sample consists of nine years of data for 106 retailers, for a total of 954 data points (Table 1)

To record the strategic responses of the 83 retailers, we searched their Web sites and annual reports, as well as articles in business publications such as *BusinessWeek*, *Forbes*, *Fortune*, *The Economist*, and *The Wall Street Journal* The sample constitutes approximately 41% of public retail firms To determine whether there was bias in sample selection, we compared the sample with the population (all public retail firms) in terms of number of employees, sales, and retained earnings for the nine-year period None of the t-statistics were statistically significant ($p >$ 10) We therefore concluded that the sample was representative of the population

TABLE 1
Distributions of Sample Retailers

SIC Codes (Two-Digit)[a]	All Retailers in COMPUSTAT Database	Complete Information (Nine-Year Data Available on COMPUSTAT and CRSP tapes): Retailers with Online Operations	Complete Information (Nine-Year Data Available on COMPUSTAT and CRSP tapes): Retailers Without Online Operations
53	43	17	2
54	48	13	4
56	52	21	12
57	39	12	2
59 (exclude 596)	77	20	3
Total	259	83	23

Variable	All Retailers	Descriptive Statistics[b]: Retailers with Online Operations	Descriptive Statistics[b]: Retailers Without Online Operations
Number of employees	25 88 (46 68)	30 03 (50 96)	10 81 (19 48)
Sales	3076 79 (5768 97)	3636 42 (6346 26)	1047 45 (1646 94)
Retained earnings	416 56 (991 64)	500 17 (1096 09)	113 36 (277 07)
Earning before interest and tax	163 81 (341 78)	196 76 (376 65)	44 32 (89 03)

[a]Retailers were classified into eight major groups SIC codes 52–59 In this study, we excluded SIC codes 52 (building materials), 55 (gasoline and car dealers), 58 (eating and drinking), and 59 (nonstore retailers)

[b]We provide mean values with standard deviations in parentheses Number of employees is measured in thousands, sales, retained earnings, and earnings before interest and tax are in millions of dollars

Measures

Performance We use Tobin's q as a measure of retailer performance In marketing literature, Tobin's q has been used in studies related to brand equity (Simon and Sullivan 1993) and customer satisfaction (Anderson, Fornell, and Mazvancheryl 2004) As a performance metric, Tobin's q has several advantages First, it is derived from stock market price, which reflects future performance and therefore is a forward-looking measure Second, Tobin's q reflects a firm's long-term profitability because it captures the relationship between the replacement cost of a firm's tangible assets and the market value of the firm (Bharadwaj, Bharadwaj, and Konsynski 1999) Third, Tobin's q can be used to compare across industries because it is not affected by accounting conventions (Chakravarthy 1986)

Specifically, we use Chung and Pruitt's (1994) method to calculate Tobin's q as follows

$$(3) \qquad Q = \frac{\text{MVE} + \text{PS} + \text{DEBT}}{\text{TA}},$$

where

Q = Tobin's q,
MVE = (closing price of shares at the end of the financial year) × (number of common shares outstanding),
PS = liquidation value of the firm's outstanding preferred stock,
DEBT = (current liabilities – current assets) + (book value of inventories) + (long-term debt), and
TA = book value of total assets

The year-end stock price is an important component of the Tobin's q formula Therefore, the results and findings depend on a single measure of stock price, which can be volatile To overcome this volatility problem, we took the average stock price at the end of the four quarters (i e , March 31, June 30, September 30, and December 31) to calculate Tobin's q (We thank an anonymous reviewer for this suggestion) The number of common shares outstanding also was taken as the average at the end of each of the four quarters (The correlation between the quarterly and the year-end measures of Tobin's q is 89)

Speed We code speed as an ordinal variable that increases by an increment of one with every year that passes after a retailer makes a strategic response (i e , adopts the Internet as a communications/sales channel or forms e-alliances) For example, if a retailer adopted the Internet as a communications channel in 1996, we code the speed of communications channel adoption in years 1992 through 1995 as 0, 1996 as 1, 1997 as 2, and so on With this measure of speed, retailers that adopted earlier score higher, and the annual incremental increases capture experiential gains (learning)

Resource slack We use factor scores calculated from two financial ratios to assess resource slack (1) retained earnings to total assets and (2) working capital to total assets Retained earnings capture the resources that a firm decides to maintain as strategic options for unforeseen eventualities and implementation strategies (Bourgeois 1981) The ratio of retained earnings to total assets accounts for firm size (total assets) and suggests that larger firms should have higher retained earnings Thus, similar to other proxies for resource slack (e g , earnings before interest and tax, Gatignon, Weitz, and Bansal 1990), the retained ratio of earnings to total assets suggests that firms with higher performance usually have greater amounts of slack resources (Nohria and Gulati 1996, Singh 1986) The working capital measure is the firm's current assets less its current liabilities, which normally include inventory, account receivables, and cash Unlike fixed assets, they are not subject to depreciation, though the devaluation of inventory may be a concern However, different accounting practices—such as cost methods, first in, first out, and last in, first out—adopted by retailers should address the issue of inventory devaluation In addition, the ratio of working capital to sales has been used in extant research (e g , Chakravarthy 1986) to represent how effectively a firm uses its liquid assets to generate sales The ratio of working capital to total assets controls for the effects of firm size (as reflected in total assets) and indicates that larger firms need greater amounts of working capital

Control variables We control for catalog retailers by coding a dummy variable as 1 if the retailer had catalog operations and as 0 otherwise Consistent with the literature (e g , Dutta, Narasimhan, and Rajiv 1999), we use the interest rate for long-term liabilities to account for the effect of cost of capital We measure ROA according to reports in the COMPUSTAT database and the change in GDP, as reported by the Bureau of Economic Analysis of the U S Department of Commerce For the Herfindahl index, we square the market share of the top four firms classified in the same SIC code as the firm of interest In Table 2, we provide the bivariate correlations among the measures

Identification of Strategic Responses

We use a historical approach to data collection (Golder 2000, Savitt 1980, Smith and Lux 1993) that involves careful examination of relevant published records We follow Golder (2000) and evaluate the criticality of archival data obtained from at least two different sources to ensure that at least one data source is neutral, that all data sources are reliable, and that the data sources are independent We carry out a structured content analysis of company annual reports,

TABLE 2
Bivariate Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10
Retailers That Adopted the Internet										
1 Tobin's q										
2 SCC	080*									
3 SSC	022	675**								
4 ALLY	– 008	287**	480**							
5 RS	– 010	– 044	– 012	– 037						
6 CAT	071	069	097**	029	034					
7 CC	101**	031	– 047	– 027	– 081*	– 020				
8 ROA	449**	– 041	– 022	– 011	377**	072*	024			
9 GDP1	048	566**	382**	212**	– 068	011	– 030	– 027		
10 HINDEX	– 055	– 008	– 114	– 024	– 057	016	090*	– 044	– 134**	
Mean	1 359	820	340	080	068	110	118	4 083	41 133	1037 131
Standard deviation	1 343	1 372	903	435	982	308	323	9 171	11 440	374 585
Retailers That Did Not Adopt the Internet[a]										
1 Tobin's q										
2 RS	– 168*									
3 CC	103	115								
4 ROA	369**	516**	147*							
5 GDP1	– 084	022	– 099	010						
6 HINDEX	171*	124	011	086	– 290**					
Mean	1 311	– 248	23 967	2 832	41 197	954 878				
Standard Deviation	1 186	1 028	163 698	9 535	11 451	296 224				

*$p <$ 10
**$p <$ 05
[a] None of the nonadopting retailers in our sample had catalog operations
Notes Tobin's q, ROA, GDP1, and HINDEX are ratio indexes, RS and CC are factor scores, and SCC, SSC, ALLY, and CAT represent categorical data Details can be found in the "Measures" section SCC, SSC, SECA, RS, CAT, CC, ROA, GDP, and HERF stand for speed of communications channel adoption, speed of sales channel adoption, speed of e-alliance formation, resource slack, catalog operations, cost of capital, return on assets, changes in gross domestic product, and Herfindahl index, respectively

press releases, and articles available on LexisNexis, *BusinessWeek*, *The Economist*, *Fortune*, *Forbes*, and *The Wall Street Journal*, as well as respective company Web sites, to identify when a retailer adopted the Internet as a communications and sales channel and when a retailer formed an e-alliance For each retailer, we searched for the following key words "online," "e-commerce," "Internet," and "Web"

For example, we searched for information on Walgreen's using the specified key words In its 1995–1998 annual reports, Walgreen's stated that shareholders could access company information, such as press releases and financial data, on its Web site Walgreen's announced in its 1999 annual report that the company became an Internet player in January 1998 Following contemporary historical research (e g , Golder 2000), we reviewed all available information with respect to Walgreen's adoption of the Internet After critically analyzing the available information, we coded 1995 as the year Walgreen's adopted the Internet as a communications channel and 1998 as the year it adopted the Internet as a sales channel In Table 3, we provide a sample of qualitative information we found and the way we coded the information

TABLE 3
Strategic Responses and Examples

Strategic Response	Examples
E-alliances	•We started forming an alliance with Microsoft Microsoft is going to provide our company marketing and technological support •We have e-alliances with Micron Electronics, Redline Entertainment, Simplexity com, and etown com •Our strategic partners include AOL and Sony Electronics •We develop alliances with other leading retailers to strengthen our e-commerce strategy •We partner with AOL and became an exclusive bookseller on AOL •We partner with major Web portals and content sites such as AOL, Lycos, and MSN
Adoption of the Internet as a communications channel	•Our Web site provides product information, company background, and current news •Our home page provides news and other financial information to shareholders •Our Web site provides information such as 10-K reports, press releases, and other stockholder information •Our Web site does not focus on Internet selling yet, but investors can visit our Web site for financial information and other company news •In 1995, we first entered the e-commerce space with the launch of xxx com
Adoption of the Internet as a sales channel	•We began to develop sales on the Internet •In 1997, we launched our public Internet site, which enables customers to shop online •During the second quarter of this year, we began selling about 1500 items from our Web site

Measure Validation

To assess the validity of the nominal data, which are based on qualitative judgments, two judges (one not involved with the research) independently analyzed the content of annual reports and other sources of information (e g , Frankwick et al 1994, Houston et al 2001) The judges first reviewed all company annual reports available on LexisNexis Missing information was collected from alternative sources such as business journals For 10 of the 83 retailers in the sample (randomly drawn), the judges worked together to develop a protocol and common understanding of the coding procedure For the remaining 73 retailers, the judges completed the tasks independently

We then assessed the Pearson product correlations between the judges' coding and the classifications of the 73 retailers We found a high level of correlations for the three major constructs for e-alliances, $r = 91$ ($p < 01$), for adoption of the Internet as a communications channel, $r = 93$ ($p < 01$), and for adoption of the Internet as a sales channel, $r = 93$ ($p < 01$) Any disagreements were resolved by discussion and revisiting the information sources Finally, factor analysis showed that the two items for resource slack loaded on the latent construct with factor loadings equal to 85

Empirical Analysis and Results

Estimation Procedure and Model Selection

The estimation procedure was driven by the need to control for unmeasured and unobservable variables (Jacobson 1990) Because there is no single model recommended for controlling for unobserved effects (Boulding 1990), we estimated two models (1) a two-factor fixed- and random-effects linear panel model (TPM) and (2) a single-factor fixed- and random-effects autoregressive panel model (ARPM) Specifically, the fixed-effects TPM model can be represented as follows

$$(4) \qquad y_{it} = \mu + \alpha_i + \gamma_t + \beta' X_{it} + \varepsilon_{it},$$

where

μ = the overall constant,
α_i = firm-specific constants,
γ_t = time-specific constants,
X = the explanatory variables,
β = a vector of the influence of the explanatory variables, and
ε_{it} = the error term, such that $E(\varepsilon_{it}) = 0$, and $E(\varepsilon_{it}^2) = \sigma_\varepsilon$

A parallel representation of the random-effects model is given as follows

$$(5) \qquad y_{it} = \mu + \beta' X_{it} + \varepsilon_{it} + v_i + \lambda_t,$$

where

v_i = the random disturbance characterizing the ith firm that is constant through time, and the assumptions are $E(v_i) = 0$, and $E(v_{it}^2) = \sigma_v$, and

λ_t = the random disturbance characterizing the tth year that is constant across firms, and the assumptions are $E(\lambda_t) = 0$, and $E(\lambda_{it}^2) = \sigma_\lambda$

The following assumptions apply $E(\varepsilon_{it}, v_j) = 0$, $E(\varepsilon_{it}, \lambda_s) = 0$, and $E(v_i, \lambda_t) = 0 \ \forall\ i, t, j$, and s Furthermore, $E(\varepsilon_{it}, \varepsilon_{js}) = 0$, $E(v_i, v_j) = 0$, and $E(\lambda_t, \lambda_s) = 0$ if $i \neq j$ and $t \neq s$, $\forall\ i, t, j$, and s

The fixed-effects ARPM model is given as follows

$$y_{it} = \alpha_i + \beta' X_{it} + \varepsilon_{it}, \text{ and} \tag{6}$$

$$\varepsilon_{it} = \rho\varepsilon_{i,t-1} + \eta_{it},$$

where ρ represents the autocorrelation coefficient, and η_{it} is the error term, such that $E(\eta_{it}) = 0$ and $E(\eta_{it}^2) = \sigma_\eta$ A parallel representation of the random-effects model is given as follows

$$y_{it} = \mu + \beta' X_{it} + \varepsilon_{it} + v_i, \text{ and} \tag{7}$$

$$\varepsilon_{it} + \rho\varepsilon_{i,t-1} + \eta_{it}$$

For both the TPM and the ARPM models, we use the Hausman (1978) test to compare the fit of the fixed-effects model with that of the random-effects model This statistic is distributed χ^2, and a statistically significant value favors the fixed-effects model We estimated the following six models

M1 the constant term (μ in Equation 4) as the only explanatory variable,
M2 firm effects only (i e , μ and α_i in Equation 4),
M3 X variables only,
M4 X and firm effects,
M5 X, firm, and time effects (this configuration does not apply for the ARPM), and
M6 a random-effects version of M5 for TPM and of M4 for ARPM

Note that for ARPM, M1–M4 are autoregressive models We use ordinary least squares to estimate models M1–M5, with dummy variables for firm and time effects when appropriate, and we use generalized least squares for M6 (for details, see Baltagi 1995) Finally, to compare TPM with ARPM, we used the Akaike, Bayesian, and consistent Akaike information criteria (AIC, BIC, and CAIC, respectively) [5]

Model Selection Results

We used a series of likelihood ratio tests to compare the first five models, whereas we compared M6 with M5 for TPM and with M4 for ARPM using the Hausman (1978) test We report the results of these tests in Table 4 The tests show that the two-way fixed-effects model (M5) outperforms the other submodels for TPM and that the one-way fixed-effects autoregressive model outperforms its submodels for ARPM The Hausman test shows that the fixed-effects

TABLE 4
Model Selection

Model	TPM Log-Likelihood	ARPM Log-Likelihood
1 Constant term only	−1609 5	−1403 6
2 Group effects only	−1078 3	−836 2
3 X variables only	−1465 3	−1264 2
4 X and group effects	−1012 2	−776 8
5 X individual and time effects	−995 1	—

Likelihood Ratio Test	TPM χ^2 (d f., *p*-Value)	ARPM χ^2 (d.f., *p*-Value)
2 versus 1	1062 4 (105, 00)	1134 9 (105, 00)
3 versus 1	288 5 (12, 00)	278 9 (12, 00)
4 versus 1	1194 6 (117, 00)	1253 6 (117, 00)
4 versus 2	132 2 (12, 00)	118 7 (12, 00)
4 versus 3	906 1 (105, 00)	974 7 (105, 00)
5 versus 4	34 1 (8, 00)	—
5 versus 3	940 2 (114, 00)	—

Information Criteria	TPM	ARPM
AIC	2276 4	1787 6
BIC	2888 7	2342 4
CAIC	3014 7	2459 4

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[5] We calculate the AIC as AIC = −2 × LL + 2 × NP, where LL and NP stand for the log-likelihood value and the number of parameters, respectively We calculate the BIC and the CAIC as BIC = −2 × LL + ln(SS) × NP, and CAIC = −2 × LL + [1 + ln(SS)] × NP, respectively, where SS stands for the sample size and ln is the natural logarithm transformation

model outperforms the random-effects model for TPM ($\chi^2 = 60\ 24$, degrees of freedom [d f] = 12, $p < 01$) Similarly, the Hausman test shows that for ARPM, the fixed-effects model outperforms the random-effects model ($\chi^2 = 66\ 06$, d f = 12, $p < 01$) The autocorrelation coefficient for ARPM is positive and statistically significant ($\rho = 32$, $p < 01$) Finally, the information criteria show that the ARPM ($R^2 = 77$) outperforms the TPM ($R^2 = 72$) [6]

Research Model Results

The results provide some support for the main effects of strategic responses (see Table 5) [7] The speed of communications channel adoption appears to enhance firm performance (TPM b = 085, $p < 05$, ARPM b = 076, $p < 05$), and slack resources strengthen this positive effect (TPM b = 055, $p < 05$, ARPM b = 060, $p < 05$) The results show that the speed of e-alliance formation also enhances firm performance (TPM b = 227, $p < 10$, ARPM b = 263, $p < 05$) However, we do not find support for the main and interaction effect of sales channel adoption This unexpected finding may be due to the empirical correlation between communications channel adoption and sales channel adoption ($\rho = 687$, $p < 01$, see Table 2) or the cannibalization potential of the Internet channel Alternatively, because we study market-based performance, the finding may reflect that the value of a firm increases when it adopts the Internet as a communications channel Furthermore, it is possible that investor attention focused on the presence of

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[6] Multicollinearity did not seem to be a concern, the highest variance inflation factor was 2 4, and the highest condition index was 3 9

[7] Descriptive statistics for the 83 firms that adopted the Internet are as follows for communications channel adoption (83 firms), there were 3 in 1995, 17 in 1996, 12 in 1997, 14 in 1998, 25 in 1999, and 12 in 2000, for sales channel adoption (50 firms), there was 1 in 1995, 3 in 1996, 3 in 1997, 9 in 1998, 23 in 1999, and 11 in 2000, and for e-alliances (34 alliances), there was 1 in 1996, 1 in 1997, 5 in 1998, 11 in 1999, and 16 in 2000 The mean year-end Tobin's q is 1 92 with a standard deviation of 1 61, the quarterly Tobin's q is 1 38 with a standard deviation of 1 54 The Tobin's q ranges from – 80 to 26 58

TABLE 5
Results from the Panel Models

Variables	Tobin's q TPM for Data to 2000	Tobin's q ARPM for Data to 2000	Tobin's q TPM for Data to 1999	Tobin's q ARPM for Data to 1999
Control Variables				
Catalog operations	– 190	– 492	– 136	– 548
	(601)	(702)	(599)	(759)
Cost of capital × 100	015	004	– 007	– 037
	(043)	(039)	(045)	(038)
ROA	033***	034***	036***	024***
	(004)	(004)	(004)	(004)
Change in GDP (ΔGDP) × 10	347*	018	364*	037*
	(230)	(026)	(226)	(024)
Herfindahl index × 100	038**	020	048**	001
	(020)	(019)	(024)	(027)
Strategic Response				
Speed communications channel (SCC)	085**	076**	118**	119***
	(042)	(033)	(051)	(043)
Speed sales channel (SSC)	– 026	– 045	012	– 010
	(056)	(051)	(077)	(074)
Speed e-alliance (SECA)	227*	263**	181	303*
	(176)	(159)	(226)	(190)
Organizational Resources				
Resource slack (RS)	– 279***	– 278***	– 274***	– 180**
	(077)	(077)	(083)	(081)
RS × RS	– 008	– 010	– 011	– 005
	(018)	(017)	(019)	(018)
Interaction Between Strategic Response and Organizational Resources				
RS × SCC	055**	060**	086**	082**
	(030)	(027)	(039)	(037)
RS × SSC	– 029	– 056	066	– 032
	(066)	(060)	(106)	(094)

*$p < 10$
**$p < 05$
***$p < 01$
Notes Standard errors are in parentheses We report one-tailed tests

nonincumbent (new entrant) firms, the so-called dot-coms, and as a result, the market valuation of incumbents was not influenced.

To explore these conjectures further, we estimate two models. In the model without communications channel adoption variables, the statistical results for sales channel adoption remain the same. When we combine the speed of sales channel adoption with a dummy variable for catalog operations, the interaction effect is positive and statistically significant, indicating that the value of retailers with catalog operations increases with the adoption of the Internet as a sales channel (TPM: $b = .199, p < .05$; ARPM: $b = .197, p < .05$). Finally, we find that slack resources tend to decrease Tobin's q (TPM: $b = -.279, p < .01$; ARPM: $b = -.278, p < .01$). The firms in our sample may have excess slack resources, and the opportunity costs associated with these resources may outweigh the gains that can be obtained from them. Managers often accumulate slack resources to pursue their own interests, which can be at odds with the organizational needs to create the strategic options that slack resources provide (Child 1972; Cyert and March 1963).

Model Robustness Results

We took three steps to ensure that the results were robust. First, we estimated the research model (Equations 1 and 2) with data until 1999 as opposed to 2000. Because the Internet "bubble" burst in 2000 (i.e., the NASDAQ market value dropped from $5.2 trillion in 1999 to $3.6 trillion in 2000), we thought it would be interesting to study how the results might change. As is shown in the two right-hand columns of Table 5, the results are substantively the same. Second, we estimated three submodels nested in the research model (Equations 1 and 2). Submodel 1 included the control variables, Submodel 2 included the control and resource variables, and Submodel 3 added the main effects of the strategic response to the control and resource variables. The signs and statistical significance of the parameter estimates did not change across the models. Third, we estimated two models nested in the research model (Equations 1 and 2). Model 1 included the interactions between the speed of e-alliance formation and the speed of communications channel adoption and sales channel adoption. Model 2 included the square terms of speed of communications and sales channel adoption. None of the effects across the two models were statistically significant. Thus, we have a fair degree of confidence that the results are robust.

Discussion

As new technologies continue to proliferate, firms in diverse industries increasingly must respond. Future economic rents and competitive advantage rests on the organizational ability to assimilate new technologies in a timely manner. To address this important research issue, we develop a general framework that describes the influence of organizational strategic responses on firm performance (Figure 1). We theorize strategic responses according to the three dimensions of magnitude, domain, and speed, and we suggest that a response can encompass one or more of these dimensions. In this framework, we rely on the resource-based view of the firm (Hunt and Morgan 1995) and the organizational learning literature (Sinkula 1994) to suggest that organizational resources determine the efficacy of the strategic response. We also operationalize the framework for retailers' response to the advent of the Internet. The results highlight the importance of organizational strategic responses and resources and demonstrate the potency of our framework.

Speedier communications channel adoption, useful in preempting competition for scarce resources (Lieberman and Montgomery 1988) and learning from experience (e.g., Sinkula 1994), seems to yield significant returns. Furthermore, firms with slack resources seem to garner greater returns from communications channel adoption. For example, the comparison of Staples and Office Depot illustrates this advantage. Staples adopted the Internet as a communications channel in 1995 and as a sales channel in 1998, whereas Office Depot, its major competitor, did not adopt it until 1998. The difference in the year 2000 Tobin's q for Office Depot (.97) and Staples (2.08) can be attributed in part to their responses to the advent of the Internet. Similarly, The Gap adopted the Internet as a communications and sales channel in 1996, whereas Urban Outfitters did not adopt it until 2000. The year 2000 Tobin's q for The Gap was 4.81, compared with 1.11 for Urban Outfitters. In Table 6, we present details about the strategic response variables and firm performance at various points in time for 40 retailers. Careful scrutiny of Table 6 provides more examples of the benefits of appropriate strategic responses.

However, sales channel adoption does not seem to influence firm performance (Christensen 1997). Perhaps the market does not reward firms for adopting the Internet as a sales channel because the adoption may cannibalize existing store operations. Alternatively, the market may reward firms for their initial communications channel adoption, and then the effect of the sales channel adoption filters in through enhanced sales and profitability. Furthermore, as a result of the attention focused on dot-com new entrants, investors may have overlooked and undervalued the online sales of incumbents. Thus, the only thing that mattered for incumbents was whether they had a Web presence. The data lean in favor of this conjecture; communications and sales channel adoptions are correlated ($\rho = .687, p < .01$; see Table 2), and profitability (ROA) positively influences Tobin's q. Furthermore, the interaction between slack resources and sales channel adoption is not statistically significant. Thus, it seems that slack resources do not enable firms to develop the new capabilities needed for sales channel adoption. Nonetheless, our *post hoc* analysis reveals a positive interaction between speed of sales channel adoption and the dummy variable for catalog operations ($p < .05$). This result suggests that firms with catalog operations that adopted more quickly tended to have higher performance.

The literature is unclear about whether e-alliances yield positive or negative consequences for retailers. On the one hand, e-alliances yield the benefits of lower transaction costs (Gulati 1998) and surrogate knowledge bases (Parkhe 1991). On the other hand, such alliances can manifest asymmetrical resource dependence, which can be harmful

TABLE 6
Information on Strategic Responses and Firm Performance on Selected Retailers

Firm Name	SIC	Year of Channel Adoption		Tobin's q			E-Alliance	
		Communications	Sales	Year 1994	A Year Before Communications Channel Adoption	Year 2000	Year Formed	Selected Partner Name
Albertson's Inc	54	1999	1999	3.59	4.48	1.83	1999	Adam.com
Ames Department Stores Inc	53	1996	1998	.69	.70	.82	2000	RetailExchange.com
AnnTaylor Stores Corp	56	2000	2000	1.74	1.74	1.21	2000	Digitas Inc
Bed Bath & Beyond Inc	57	1999	1999	6.79	8.80	6.28	1999	WeddingNetwork.com
Best Buy Co Inc	57	1997	1998	1.30	.80	1.84	1999	Microsoft Corp
Dillard's Inc	53	1997	2000	1.10	1.18	.63	—	—
Federated Department Stores	53	1996	1999	.67	.82	.78	1998	IBM
Foodarama Supermarkets	54	1999	1999	1.06	1.51	1.38	—	—
The Gap Inc	56	1996	1996	2.75	3.33	4.81	—	—
Good Guys Inc	57	2000	2000	1.20	1.04	1.23	—	—
Gottschalks Inc	53	1997	1997	.78	.70	.77	—	—
Ingles Markets Inc	54	1999	1999	1.35	1.36	1.45	—	—
Jacobson Stores	53	1999	1999	.87	1.07	.95	—	—
Jo-Ann Stores Inc	59	1999	1999	1.01	1.06	.90	2000	IdeaForest.com
Kmart Corporation	53	1995	1995	1.15	1.15	.98	1999	Yahoo! Inc
Longs Drug Stores Corp	59	1999	1999	1.32	2.51	1.46	1999	planet U
Marsh Supermarkets	54	1998	1998	1.04	1.18	1.08	—	—
May Department Stores	53	1996	2000	1.43	1.55	1.74	2000	WeddingNetwork.com
Michaels Stores Inc	59	1996	1999	1.64	.94	1.30	—	—
Mothers Work Inc	56	1999	1999	1.26	1.36	1.42	—	—
Neiman Marcus Group	53	1999	1999	1.16	1.43	1.54	2000	RichFX Inc
Nordstrom Inc	56	1999	1999	2.23	2.96	1.76	—	—
Office Depot Inc	59	1998	1998	2.45	1.75	.97	1998	Microsoft Corp
Pier 1 Imports Inc	57	2000	2000	1.15	1.42	2.04	—	—
RadioShack Corporation	57	1999	1999	1.36	3.33	4.66	1999	Microsoft Corp
Rex Stores Corporation	57	1999	1999	1.13	.83	.82	1999	Zengine Inc
Rite Aid Corporation	59	1999	1999	1.67	2.01	1.12	1999	Drugstore.com
Safeway Inc	54	1997	2000	2.18	3.98	3.26	2000	GroceryWorks.com
Saks Inc	53	1998	2000	1.07	1.59	.89	—	—
Smart & Final Inc	54	1996	1996	1.56	2.01	.99	—	—
Sport Chalet Inc	59	1999	1999	1.12	1.27	.74	—	—
Staples Inc	59	1998	1998	2.13	2.52	2.08	1999	Point.com Inc
The Talbots Inc	56	1999	1999	2.60	2.27	4.77	—	—
Target Corporation	53	1998	1999	1.23	2.01	2.50	1999	E*Trade
Tiffany & Co	59	1998	1998	1.49	1.85	3.52	—	—
Todays Man Inc	56	1999	1999	1.46	1.12	.89		
Toys "R" Us Inc	59	1998	1998	1.90	1.77	1.11	1999	Amazon.com
Ultimate Electronics Inc	57	1998	1998	1.67	.79	1.91	—	—
Urban Outfitters Inc	56	2000	2000	4.28	4.03	1.11	2000	WebLinc
Winn-Dixie Stores Inc	54	1998	2000	5.86	6.56	5.64	—	—

for the nontechnical, or store-based, partner (Das, Sen, and Sengupta 1998) In addition, if e-alliances are formed because others are doing so (i e , the bandwagon effect), the consequences of the alliances can be negative (e g , Pangarkar and Klein 1998) Our results show that the gains of lower transaction costs and surrogate knowledge bases seem to overshadow any losses due to asymmetrical resource dependence [8]

Limitations and Future Research Implications

We rely on secondary data to test the model, and thus our investigation is limited to the variables for which we could obtain data For example, a measure such as dollar spending on online operations would be appropriate to capture response magnitude Furthermore, our sample is limited to public firms, which means that many private retailers are not captured in this research Although we use the Herfindahl index to control for competitive effects, we do not include nonincumbent retailers that used Internet-based business models It would be interesting to study the competition between incumbents that adopt a new technology to supplement existing operations and nonincumbents that rely primarily on the new technology In addition, we suggest that strategic variables determine the market valuation of the firm However, it is possible that market valuation drives some strategic response variables, specifically e-alliance formation In other words, firms that are highly valued may seem to be attractive alliance partners Further research is needed to rule out such endogeneity Finally, as in most secondary data research, we do not account for measurement error, which can lead to biased estimates Such measurement error manifests itself in measures obtained from COMPUSTAT, such as resource slack and Tobin's q, and from strategic response measures we coded using other secondary data sources, such as searches on LexisNexis These limitations provide potentially fruitful avenues for further research

Theoretical Implications

The two primary theoretical contributions of this research are the development of a conceptual framework for strategic responses to new technologies and the linking of marketing actions to market valuation of the firm First, we suggest that strategic response and organizational resources together affect firm performance Our conceptualization of organizational strategic responses is a potent tool that researchers can use to study the adoption and assimilation of new technologies The illustration of the adoption of the Internet demonstrates the potency of the proposed framework and exemplifies how the framework can be operationalized

Second, when the value of marketing as a discipline is questioned, the linking of marketing actions to shareholder wealth is likely to go a long way toward further establishing the worth of the discipline (Day and Fahey 1988) We theoretically link marketing actions in response to new technologies with the market valuation of the firm and empirically establish this link For example, the results show that shareholders value the improvements in marketing communications that can be attributed to the adoption of the Internet In other words, shareholders value marketing decisions related to new technology and foresee future economic gains in the organizational adoption and assimilation of new technologies

From a methodological standpoint, we use secondary data from multiple sources to study a strategic marketing research issue Whereas most research on marketing strategies relies on survey data and suffers from common methods bias, we show that the relationship between strategic marketing actions and firm performance is not an artifact of common methods The longitudinal nature of the study also illustrates the dynamic nature of the effects of strategic marketing actions

Finally, we contribute to the growing literature that attempts to make sense of the implications of the emergence of the Internet Although the advent of the Internet is considered critical for the business arena, to date we are unaware of any attempt to link strategic responses to its advent with the market valuation of the firm (cf Geyskens, Gielens, and Dekimpe 2002) The model sheds some light on this important question and emphasizes the importance of modeling the interactions between organizational strategic responses and resources (Figure 2)

Managerial Implications

This research also sheds light on two important strategic issues for managers the value of strategic responses to new technologies and the market valuation of the firm The results suggest that an appropriate response—as defined by response magnitude, domain, and speed—is needed to assimilate new technologies successfully In our results, retailers that speedily adopted the Internet as a communications channel were more valued by their shareholders For example, our model predicts a Tobin's q of 907 for a retailer that adopted the Internet as communications channel in 1994, 2 4 times greater than the Tobin's q of 375 for a retailer that did not adopt the Internet until 2000 (if all other variables are fixed at their mean values) and almost twice that of a retailer that waited until 1999 to adopt (527) The results also suggest that firms not oriented toward technology can benefit from partnering with technology firms because such alliances lower transaction costs and provide surrogate knowledge bases For example, a firm that adopted the Internet as a communications channel in 1994 and engaged in an e-alliance would have a Tobin's q of approximately 2 729, more than three times greater than that of a firm that adopted in 1994 but did not form any e-alliances Our results also highlight the importance of using slack resources to adopt the Internet as a communications channel However, although slack resources may be useful in ventures that do not require the development of new capabilities, they are not effective for reengineering business processes when new capabilities must be developed (e g , sales channel adoption)

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[8] It is important to recognize that because of the way we operationalize e-alliances, we will find positive, negative, or statistically nonsignificant parameter estimates Thus, we will find support for at most one of the two perspectives It would be valuable to come up with other operationalizations of e-alliances (e g , that use two operationalizations) to find support for both positive and negative effects (We thank an anonymous reviewer for this suggestion)

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Eugene W. Anderson, Claes Fornell, & Sanal K. Mazvancheryl

Customer Satisfaction and Shareholder Value

In this article, the authors develop a theoretical framework that specifies how customer satisfaction affects future customer behavior and, in turn, the level, timing, and risk of future cash flows Empirically, they find a positive association between customer satisfaction and shareholder value They also find significant variation in the association across industries and firms

Does satisfying customers go hand in hand with satisfying shareholders? For customers and customer satisfaction to become an important topic for senior management and shareholders, there must be rigorous theoretical and empirical support for a positive association between customer satisfaction and long-term financial performance In the absence of such findings, people involved in corporate governance are likely to remain ambivalent toward customer satisfaction as a business performance metric (Ambler 2000, Barwise, Marsh, and Wensley 1989, Day and Fahey 1988, Srivastava, Shervani, and Fahey 1998)

A growing body of research links customer satisfaction and accounting-based measures of financial performance, such as operating margin (Bolton 1998, Rust, Zahorik, and Keiningham 1994, 1995), return on investment (ROI, Anderson, Fornell, and Lehmann 1994, Anderson, Fornell, and Rust 1997, for a review, see Zeithaml 2000), and accounting returns (Ittner and Larcker 1998) However, empirical work based on accounting measures does not measure shareholder value reliably (Rappaport 1986) Although accounting approaches provide valuable insight, they cannot be viewed as a substitute for direct examination of the association between customer satisfaction and long-term financial performance, as measured by data from capital markets

The objective of this article is to provide the first extensive theoretical and empirical examination of the association between customer satisfaction and shareholder value We begin by discussing why a positive association between customer satisfaction and long-term financial performance should be expected We develop a framework that specifies how customer satisfaction affects current and future customer behavior and how, in turn, the behavior of satisfied customers influences the level, timing, and risk of future cash flows and, consequently, shareholder value We also posit why and how this association varies systematically across industries

The study builds on research that relates customer satisfaction to accounting-based measures of financial performance and to the one previous study that examines the association between customer satisfaction and shareholder value Ittner and Larcker (1996) examine the correlation between customer satisfaction and a firm's raw market value, but they find mixed and inconclusive results This article builds on Ittner and Larcker's pioneering work in two ways First, our conceptual framework explicates the underlying theoretical mechanisms that link satisfaction and shareholder value Second, although their work uses an event study approach and examines only one year of data, we have access to a longer time series, and we employ correspondingly sophisticated techniques of analysis to better control for potential sources of estimation bias

To test our hypotheses, we employ the American Customer Satisfaction Index (ACSI) database of nearly 200 publicly traded *Fortune* 500 firms from 1994 to 1997 We review several widely used measures of shareholder value and select Tobin's q, a measure that is forward looking, risk adjusted, comparable across firms, and well-grounded in economic theory The findings indicate that the association between ACSI and Tobin's q is positive and significant, even after we control for unobservable factors We also observe that ACSI is positively associated with two measures equity prices and ratios of price to book value Finally, we find significant systematic variation in the association between ACSI and Tobin's q across industries A test for underlying industry characteristics that moderate the association indicates that it is weaker in more fragmented industries that are characterized by a high degree of rivalry

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Hypothesis Development

The fundamental logic that underlies our theoretical framework is that (1) customers are the primary source of all future positive cash flows, and (2) customer satisfaction is a significant indicator of the strength of the firm's customer relationships (and thus the timing, level, and stability of cash flows)

In this section, we propose a new conceptual framework that combines three distinct theoretical components (1) traditional arguments about how customer satisfaction influences customer behavior, (2) a new linkage between customer satisfaction and the relative bargaining power of the firm, and (3) how both customer behavior and the firm's bargaining power derived thereof influence shareholder value

To begin, we discuss how customer satisfaction influences shareholder value through customer behaviors that determine the timing, level, and stability of cash flows Next, we address the role of competitive forces and how these influence the association between customer satisfaction and shareholder value

Customer Satisfaction and Shareholder Value

A growing body of empirical work supports the fundamental logic that customer satisfaction should positively influence customer retention (Anderson and Sullivan 1993, Bearden and Teel 1983, Bolton 1998, Bolton and Drew 1991, Boulding et al 1993, Mittal and Kamakura 2001, Oliver 1980, Oliver and Swan 1989, Yi 1991) It is argued that by increasing retention, customer satisfaction secures future revenues (Fornell 1992, Rust and Zahorik 1993, Rust, Zahorik, and Keiningham 1994, 1995) and reduces the cost of future customer transactions, such as ones associated with communications, sales, and service (Reichheld and Sasser 1996, Srivastava, Shervani, and Fahey 1998) As a consequence, net cash flows should be higher At the same time, greater customer retention indicates a more stable customer base that provides a relatively predictable source of future revenue as customers return to buy again, one that is less vulnerable to competition and environmental shocks (Anderson and Sullivan 1993, Narayandas 1998) Thus, customer retention also should positively affect shareholder value by reducing the volatility and risk associated with anticipated future cash flows

Additional satisfaction-driven customer behaviors that are likely to influence shareholder value include buying more of a particular product or service from a given supplier, buying additional products and/or services, making recommendations to others, and increasing price tolerance Although not all these behaviors are expected to play a role in every industry, a significant subset is likely to provide the underlying mechanism with which customer satisfaction influences shareholder value in any industry

First, customer satisfaction should lead customers to purchase more requirements from the supplying firm (e g , Bolton 1998, Bolton, Kannan, and Bramlett 2000, Verhoef, Franses, and Hoekstra 2001) When this happens, acquisition and transaction costs decline and revenues increase, thus enhancing the size of net cash flows

Second, greater cross-buying also may result from higher levels of customer satisfaction (Reichheld and Sasser 1996) Cross-selling not only enhances net cash flows in a manner similar to supplying a greater share of customer requirements but also accelerates the timing of new cash flows A loyal and satisfied customer base provides a ready market for new add-on services or product-line extensions Thus, we should expect customer satisfaction to lead to faster market penetration and, in turn, to accelerated cash flows (Srivastava, Shervani, and Fahey 1999)

Third, recommendations and positive word of mouth from satisfied customers also are expected to influence shareholder value Positive word of mouth should lead to lower acquisition costs and thus to greater net cash flow (Anderson 1998, Fornell 1992) Positive word of mouth should also help a firm penetrate new and existing markets and thus should lead to accelerated cash flows

Finally, greater customer satisfaction may enable the firm to charge higher prices or at least to better resist downward pressure on prices (Anderson 1996, Narayandas 1998) Thus, greater customer satisfaction may lead to greater shareholder value through increased price tolerance

In addition to the classic linkages between customer satisfaction and customer behavior that we have discussed, we posit that customer satisfaction influences shareholder value through its impact on competitive forces A loyal and satisfied customer base increases the organization's relative bargaining power with respect to suppliers, partners, and channels Such a customer asset provides a source of leverage with respect to other members of the firm's value chain that want to serve the same customer base Suppliers and other partners are likely to value and to seek to maintain favorable relationships with a firm that "owns" such a valuable asset Channel members should be more likely to provide favorable treatment to firms whose offerings will help them attract and retain customers Thus, a firm that creates superior satisfaction should be able to extract greater value from the networks of suppliers, partners, and channels that serve a market in the form of lower costs, higher volumes and prices, and faster market penetration The combined effect should be to raise the level of net cash flow and to lower the risk of anticipated future cash flows for firms with relatively high satisfaction

Following this reasoning, we state the following main hypothesis

> H_1 There is a positive association between customer satisfaction and shareholder value

Cross-Industry Variation

We expect significant variation in the association between customer satisfaction and shareholder value across industries Both industry and customer factors are likely to dampen or amplify the effect For example, we posit that the degree of competition affects the link between market orientation and firm performance (Kohli and Jaworski 1990, Slater and Narver 1994) A similar logic should hold for customer satisfaction In terms of customer characteristics, customer satisfaction may have a greater or lesser affect on customer behaviors from industry to industry and, consequently, on shareholder value

Empirically, Anderson, Fornell, and Rust (1997) find the association between customer satisfaction and ROI to be greater for goods than for services Ittner and Larcker (1998) find the correlation between customer satisfaction and market value to be negative for retailers

We follow the literature on market orientation in arguing that the degree of competition, as measured by the widely used proxy of degree of concentration, in an industry should affect the association between customer satisfaction and shareholder value (Kohli and Jaworski 1990, Slater and Narver 1994) The degree of concentration should affect both customer behavior and the firm's relative bargaining power and thus the degree to which customer satisfaction affects shareholder value When an industry is fragmented and concentration is low, the degree of rivalry in the industry is likely to be more intense Even satisfied customers are likely to be more difficult to retain and more price sensitive and to find other supply sources At the same time, the firm's ties to its customers will be weaker and the relative bargaining power of the firm reduced Thus, the association between customer satisfaction and shareholder value should be attenuated in more fragmented markets that are characterized by low concentration

Following this reasoning, we state the following moderating hypothesis

> H_2 As the degree of concentration in an industry declines, the impact of customer satisfaction on shareholder value is less positive

Summary

We expect that the association between customer satisfaction and shareholder value is positive because customer satisfaction provides a valuable, forward-looking indicator of future net cash flows In addition, when the degree of concentration is low, we expect customer satisfaction to have less of an impact on shareholder value In the remainder of this article, we discuss the measurement and testing of (1) the direct association between customer satisfaction and shareholder value and (2) the moderating role of concentration on this association

This conceptual framework rests in a broader nomological network that includes other company- and context-specific factors that may affect customer satisfaction, shareholder value, and the association between the two For our modeling efforts, we first focus on an appropriate reduced-form specification to estimate the association between customer satisfaction and shareholder value, employing appropriate controls for the company- and context-specific factors that are "unobservable" and not explicitly included in the model Next, we examine cross-industry variation and test whether the degree of industry concentration plays a role, as we hypothesize

Measuring Customer Satisfaction

The testing of our hypotheses requires appropriate measures of customer satisfaction and shareholder value The ACSI (Fornell et al 1996) measures overall customer satisfaction An individual firm's ACSI represents its served market's (i e , its customers') overall evaluation of total purchase and consumption experience (Anderson, Fornell, and Lehmann 1994, Fornell 1992, Johnson and Fornell 1991)

Fornell and colleagues (1996) provide a detailed description of the nature and purpose of ACSI Here, we briefly summarize its key features First, ACSI measures customer satisfaction as experienced by customers, rather than by expert ratings (e g , *Consumer Reports)* or managers' perceptions (e g , PIMS) Second, it is designed to provide a comprehensive picture of customer satisfaction for each of seven major economic sectors In each sector, the largest industries and the largest firms in each industry are measured The total sales of the 200 *Fortune* 500 firms included in ACSI amount to more than 40% of the U S economy's annual gross domestic product Third, ACSI provides a uniform set of comparable customer-based firm performance measures for a broad range of manufacturing and service firms that can be matched with traditional accounting-based performance measures and capital market data Thus, ACSI offers a unique and powerful database to test the study's hypotheses

Measuring Shareholder Value

We require a long-term measure of firm economic value, one that is forward looking and cumulative The measure should also be generalizable and comparable across firms in many different industries Finally, the measure needs to be such that we can develop a theoretically sound econometric model for our empirical test

Most research on firm performance has relied on accounting-based ratio measures, such as ROI (Buzzell and Gale 1987, Jacobson 1988, 1990a) and return on assets (ROA) Other studies use direct measures such as sales (Dekimpe and Hanssens 1995), price (Boulding and Staelin 1995), and cost (Boulding and Staelin 1993) However, such measures typically contain little or no information about the future value of a firm (Geyskens, Gielens, and Dekimpe 2002) Because of industry and firm differences in accounting practices, a comparison of these measures across industries and firms is problematic

Ratio measures such as ROI and ROA have the advantage of greater comparability across firms, at least across firms within an industry However, these measures represent accounting profit, whereas our focus is on economic profit The ROI measure assumes that previous investments affect only current-period earnings, but in reality they can affect future earnings as well Thus, ROI reports previous profitability, but it is not a forward-looking measure It is also sensitive to accounting conventions and tax laws Moreover, ROI may be easier to manipulate than capital market data

With respect to capital market–based measures of firm performance, a parsimonious candidate is a firm's stock price, which traditionally is considered a key benchmark of its future financial performance According to the efficient market theory, stock prices incorporate all information about expected future earnings (Fama 1970) Thus, the price of a stock can be viewed as a measure of long-term performance and value that is forward looking and cumulative However, by itself, stock price represents an arbitrary division of shareholder or market value by however many shares are offered Therefore, stock prices lack a natural common baseline that allows for comparison across firms or industries

Stock returns are used to convert stock prices to a common baseline, yet stock returns are not risk adjusted One firm may have a high stock return and high market risk, whereas another firm may have a low stock return and low market risk, yet both would be appropriate

Examination of "abnormal" stock return (i e , the degree to which a stock return exceeds a "normal" baseline return) has become a common means for evaluating whether a particular event provides unanticipated information to the capital market that is subsequently incorporated into stock price If the current study were to focus on whether the announcing of ACSI scores has an impact on stock price, it would be appropriate to use an event study approach to determine whether subsequent returns indicated that such announcements contained information unanticipated by the stock market However, rather than being concerned with an announcement effect, in our main hypothesis, we are concerned with whether firms that achieve higher levels of customer satisfaction also exhibit greater shareholder value and cannot be easily tested using stock price changes (Montgomery and Wernerfelt 1988) In addition, the use of abnormal returns can be problematic, because there remains controversy over how to establish a normal return as a baseline (Fama 1998)

A forward-looking, capital market–based measure of the value of a firm is Tobin's q A firm's q value is the ratio of its market value to the current replacement cost of its assets (Tobin 1969) The intuition is that replacement cost (the denominator of q) is a logical measure of alternative uses of a firm's assets A firm that creates a market value that is greater than the replacement cost of its assets is perceived as using its resources more effectively and thus as creating increased shareholder value (Lewellen and Badrinath 1997) A firm that does not create incremental value has a Tobin's q equal to 1 The gap between a firm's Tobin's q and 1 indicates the degree of anticipated future abnormal returns

Tobin's q (or simply q) has gained wide acceptance as a measure of a firm's economic performance It is based on the supposition that the securities market efficiently evaluates the firm's expected future revenue stream in determining the firm's value Because the q value is based on the stock price of a firm, it is a more forward-looking measure (i e , it is based on the anticipated future performance of the firm) than measures such as ROI, which measure historical financial performance Tobin's q is also adjusted for expected market risk and is less affected by accounting conventions, which makes it comparable across firms in different industries As Montgomery and Wernerfelt (1988, p 627) point out, "By combining capital market data with accounting data, q implicitly uses the correct risk-adjusted discount rate, imputes equilibrium returns, and minimizes distortion "

McFarland (1988) uses a Monte Carlo simulation to compare actual constructed values of q and ROI with their respective estimated values The findings indicate that whereas both are useful measures of profitability, estimates of q have smaller average errors than the accounting rate of return McFarland also finds that estimates of q tend both to have a much higher average correlation with their true measures than do estimates of ROI and to outperform ROI measures in econometric models of performance The implication of this work is that Tobin's q has superior measurement properties than ROI

A review of the empirical literature in industrial organization and financial economics shows an increasing use of q Important applications include analysis of industry structure and economic rents (Hirschey 1985, Smirlock, Gilligan, and Marshall 1984), the effects of diversification on a firm's performance (Lang and Stultz 1994, Montgomery and Wernerfelt 1988), the role of multinationality in shareholder value creation and destruction (Reid and Harrison 2000), and the contributions of information technology assets to firms' future growth potential (Bharadwaj, Bharadwaj, and Konsynski 1999) In marketing, Tobin's q has been applied in measuring the value of brand equity (Simon and Sullivan 1993)

There are several notable challenges and limitations in the use of Tobin's q First, the numerator of q uses stock market–based information to measure the long-term value of a firm This is an indirect and external method of measuring something that is, in a sense, intrinsic to the firm (Sheperd 1986) and is subject to fluctuation on the basis of sudden changes in overall market factors and other extraneous influences Second, the denominator of q excludes intangible assets from its calculations The intangible assets contribute to the value of a firm, but estimates of replacement costs for such assets are not a part of the denominator This results in an "overestimation" of a firm's true q value Third, estimation of the replacement value of a firm's tangible assets is complex and can be quite difficult to compute (Hall et al 1988) In the "Methodology" and "Data" sections that follow, we use prescribed methods for calculating q and for controlling for potential factors that have been shown to minimize these limitations as much as possible

In summary, Tobin's q appears to be the best measurement option, given its strengths of being forward looking, comparable across firms, and based on economic theory In the following section, the latter characteristic plays an important role as we turn our attention to specifying an appropriate econometric model for our empirical test

Methodology

In addition to providing a measure of the value of a firm, the usefulness of Tobin's q is in its ability to trace the sources of this value Following the work of Lindenberg and Ross (1981), we decompose Tobin's q as a function of the firm's market value, M_t, normalized with respect to the replacement cost of the firm's physical assets

$$q = M_t/M_k = f(M_k, M_c, M_n, M_d)/M_k, \tag{1}$$

where M_k is the replacement cost of the firm's assets (e g , plant, equipment) and is equal to the value of the firm that is attributable to its tangible assets, M_n represents monopoly rents attributable either to a monopoly position or to entry barriers, M_c is the portion of company-specific rents that are attributed to a firm's cost-reducing factors, and M_d is the part of the total value of the firm that is attributed to company-specific factors (including market-based assets) that contribute to firm value Accordingly, we specify the following

$$(2) \qquad q_{it} = SAT_{it}^{\beta_1} AS_{it}^{\beta_2} MS_{it}^{\beta_3} CONC_{it}^{\beta_4} e^{\alpha_0 + \varepsilon_{it}},$$

where

q_{it} = Tobin's q value of firm i at time t,
SAT_{it} = firm i' s satisfaction level at time t,
AS_{it} = advertising-to-sales ratio of firm i at time t,
MS_{it} = market share of firm i at time t,
$CONC_{it}$ = concentration level of firm i's industry,
α_0 = constant,
β_i = corresponding slope coefficients, and
ε_{it} = stochastic error term

Market-based assets that lead to shareholder value are captured by the firm's satisfaction levels as determined by the ACSI (SAT) To focus on the relationship between customer satisfaction and shareholder value, we use conventional controls to account for rents that are due to monopoly factors, M_n, and to firm-specific factors, M_c (Simon and Sullivan 1993) To control for monopoly factors, we employ industry concentration (CONC) as a control variable (Gale 1972, Smirlock, Gilligan, and Marshall 1984) To capture the effect of firm-specific factors, we include the firm's market share (MS) and advertising-to-sales ratio (AS) (Montgomery and Wernerfelt 1988) Taken together, these covariates control for firm- and industry-specific sources of economic rents (Scherer 1990), as well as sources of value creation other than satisfaction (Montgomery and Wernerfelt 1988) Linearization of Equation 2 yields

$$(3) \qquad \ln q_{it} = \alpha_0 + \beta_1 \ln SAT_{it} + \beta_2 \ln AS_{it} + \beta_3 \ln MS_{it} + \beta_4 \ln CONC_{it} + \varepsilon_{it}$$

In estimating Equation 3, we must control for potential bias that is due to omitted fixed, random, and time-varying effects As we discussed previously, there are many company- and context-specific factors for which we cannot directly control, such as managerial expertise, firm efficiencies, regulatory environment, and luck [1]

A series of methodological approaches for addressing omitted variables has gained wide acceptance in marketing (Boulding 1990, Boulding and Staelin 1993, Erickson and Jacobson 1992, Jacobson 1990a, b) In our empirical work, we apply these recommended methods First, to control for the possible presence of random effects among the financial measures, we follow the standard practice of employing instruments that are lagged one period beyond the error term for each specification, M0 (Boulding and Staelin 1995) As we discuss subsequently, using a theoretically specified set of related variables as instruments, we estimate ACSI as a latent variable in a separate analysis that accounts for measurement error

Second, to control explicitly for time-invariant unobserved firm- and industry-level fixed effects, we follow standard practice and transform the model through first-differencing We label the resultant specification, M1, the "instrumental variable/fixed-effect" (IV/FE) specification Once again, we use instrument variables to estimate M1 In this case, the instruments are independent variables that are lagged one period beyond any information contained in the error, or t – 2

Another potential source of bias in Equation 3 is serial correlation (Boulding and Staelin 1993) Serial correlation in our context may be due to factors such as consumer tastes, research and development efforts, and industry trends To address this potential source of bias, we follow standard practice and employ quasi differencing, or ρ differencing We label this model, M2, the "IV/FE/serial correlation" (IV/FE/SC) specification We estimate this model using the iterative procedure of Hildreth-Lu, which selects the value of ρ that minimizes the sum of squared error (Greene 1993) For instruments, we use lagged values of t – 2 or t – 3 as appropriate

Data

For customer satisfaction, we used annual ACSIs from 1994 to 1997 that were made available to us by the National Quality Research Center at the University of Michigan The ACSI methodology provides a uniform, independent, customer-based, cumulative, firm-level satisfaction measure for nearly 200 companies in 40 industries and in 7 sectors of the U S economy It covers more than 40% of the gross domestic product of the United States and includes both the private sector and the public sector The raw data for the ACSI are collected from random telephone surveys of customers (at least 200 customers per firm) who have recently consumed a specific brand of a firm's product or service Respondents are asked questions on 15 measurement variables, which are then used as indicators of 6 latent variables or constructs, including the overall customer satisfaction index, ACSI, which can range from 0 to 100

The ACSI methodology uses a multiple indicator approach to measure ACSI as a latent variable A version of partial least squares (PLS) is used to estimate the model, PLS is an iterative procedure for estimating causal models that does not impose distributional assumptions on the data and that accommodates continuous and categorical variables Using the 15 survey response variables as instruments, PLS estimates weights for each instrument that maximize the ability to explain customer loyalty as the ultimate endogenous or dependent variable The estimated weights are used to construct index values (transformed to a 100-point scale) for ACSI and the other model constructs The resultant indexes have been shown to have high reliability (Fornell et al 1996), that is, the extent to which the variation of the measure is due to the "true" underlying phenomenon rather than random effects

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[1] It is worth noting that some studies of Tobin's q have used one or more additional control variables, including firm size, leverage, ROI, ROA, and market growth

To calculate the dependent variable, Tobin's q, we estimated the components of the denominator and the numerator in the following equation:

$$(4)\qquad q = \frac{\text{Total market value of all outstanding securities}}{\text{Total replacement costs of assets}}$$

There are several possible methods to measure q (Hall et al. 1988, Lindenberg and Ross 1981). We used an approach that is gaining wide acceptance in the economics and finance literature: Chung and Pruitt's (1995) method (Berger, Ofek, and Swary 1996). The details of this calculation are provided in the Appendix.

To obtain an accurate and appropriate measure of market share and to be consistent with our dependent variable, we departed from conventional techniques of measuring market share, which use either industry reports or overall sales figures from databases (Szymanski, Bharadwaj, and Varadarajan 1993). We determined division-level U.S. annual sales for each firm in our samples using the detailed data available in the company's 10-K reports. We then used these figures to calculate the relative market shares of the firms in the ACSI. We measured industry concentration using the Herfindahl–Hirschman index (HHI), which is the sum of the squared market shares of the firms in the industry (Schmalensee 1977).

To calculate advertising intensity, we used brand-level domestic advertising expenses from Competitive Media Reporting (1993–1997). This method provides an advertising measure that is not only suitable but also more accurate than the measures of advertising intensity that currently are used in marketing research (Ailawadi, Farris, and Parry 1999).

We took special care with the diversified corporations in the sample. We collated U.S. annual sales figures for each division using the disaggregated segment- and division-level data in the company's 10-K reports. On the basis of the sales data, we calculated market share and the concentration measure (HHI) for each division (range: .10 to .61). For each division of the company for which division-level ACSI data were available, we used the division-level market share and concentration values as independent variables in our regressions. For example, Sara Lee has two divisions, foods and apparel, for which separate ACSI data were collected (at the division level) for the period under analysis. Therefore, we calculated sales, market share, and concentration index levels for both divisions and used them in the analysis along with the appropriate ACSI score. For Procter & Gamble, ACSI data were available only for the personal products division. We matched these data with sales, market share, and concentration indexes for the personal products division. For diversified companies in which only company-level ACSI data, not division-level ACSI data, were available, we also aggregated the sales level, shares, and concentration indexes to the company level.

TABLE 1
Means and Standard Deviations for Full Data Set

	q	SAT	SHARE	CONC	AS
Mean	1.35	77.71	.17	.23	1.69
Standard deviation	.93	6.02	.15	.11	2.34

After we deleted companies because of missing data and mergers, we had a total of 330 usable observations over four years for M1, which we reduced to 216 observations for M2. The means and standard deviations for the full data set are shown in Table 1. Correlations among the variables used in the analysis are given in Table 2.

Findings

The findings for H_1 are summarized in Table 3. As Table 3 shows, the association between customer satisfaction and shareholder value (as measured by Tobin's q) is positive and significant in both specifications (albeit marginally in M2). The estimates are also close in value, given the standard errors.

For our data set, the Hausman test suggests that the IV/FE specification (M1) is appropriate. It indicates that our controlling for both random and fixed effects offers an improvement over simply controlling for random effects, yet the test also indicates that the IV/FE/SC (M2) specification provides no further improvement (m = 3.017). Thus, in the following discussion, we focus on the estimates for M1.[2]

TABLE 2
Correlations for Variables in Specifications M1 and M2

	ΔlnQ	ΔlnSAT	ΔlnSHARE	ΔlnCONC	ΔlnAS
ΔlnQ	1.000	.162***	.029	–.086	.084*
ΔlnSAT	.162***	1.000	.086	.165***	.042
ΔlnSHARE	.029	.086	1.000	.112**	–.104*
ΔlnCONC	–.086	.165***	.112**	1.000	.107**
ΔlnAS	.084*	.042	–.104*	.107**	1.000

**p* < .10
***p* < .05
****p* < .01

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[2] Previous research has shown that q is autocorrelated even after accounting for fixed effects. The relatively low autocorrelation may be due to our small sample. We also estimated models using both a state-dependent formulation (lagged q) and one that included the unanticipated effects of ROI. In both cases, the association between ACSI and q remained significant and of similar magnitude.

TABLE 3
Summary of Estimation Results: Overall Tobin's q–Customer Satisfaction Hypothesis

Model	Intercept	$\beta_{SAT,t}$	β_{AS}	β_{SHARE}	β_{CONC}	ρ	R^2	Number of Observations
M0	–6 82***	1 74***	03**	08***	30***	—	18	456
(ordinary least squares)	(1 72)	(39)	(01)	(02)	(07)			
M1	69	1 62**	03***	00	29**			
(IV/FE)	(45)	(71)	(01)	(03)	(11)	—	16	330
M2	89	1 28*	02	01	29*			
(IV/FE/SC)	(95)	(80)	(05)	(03)	(15)	05	07	216

*p < 10
**p < 05
***p < 01

The findings for the remaining independent variables are notable We found the coefficient for industry concentration to be positive and significant at 29 in M1 This indicates that increased concentration levels enable a firm to capture increased Ricardian rents (Ricardo 1817, Scherer 1990) and to create shareholder value, which is consistent with other studies that apply Tobin's q (Lindenberg and Ross 1981, Montgomery and Wernerfelt 1988, Simon and Sullivan 1993)

We found the coefficient for market share to be insignificant in both M1 and M2 Thus, after we controlled for omitted fixed effects and the effects of satisfaction, advertising, and market concentration, there is little support for the argument that high market share is a result of a firm's ability to perform value-adding activities better than its competitors This finding is consistent with theory and with findings in economics (Smirlock, Gilligan, and Marshall 1984, 1986) and marketing (Fornell 1995, Jacobson and Aaker 1985) The finding implies that rents that often are posited to be associated with market shares might be due to concentration levels in an industry When the association between concentration and firm value is taken into account, market share does not have an incremental association with value in our data set

The coefficient for advertising intensity is positive in M1, but its impact is relatively small, at 03 This finding suggests that the intensity of advertising has, at best, a small role in building long-term value when we control for the impact of both customer satisfaction efforts (which may or may not be advertising related) and other firm- and market-level variables

As a check on our findings, it is worthwhile to examine the association between ACSI and other measures of long-term financial performance To this end, Table 4 summarizes correlations between year-to-year changes in ACSI and contemporaneous changes in two alternative measures of firm value equity price and the ratio of price to book value We calculated these accounting measures using data from the Center for Research in Securities Prices and COMPUSTAT for 114 publicly held firms in the ACSI sample As Table 4 shows, there is a positive correlation between changes in ACSI and contemporaneous changes in both alternative measures, which indicates further support for a positive association between customer satisfaction and shareholder value[3]

TABLE 4
Comparing Changes in ACSI with Contemporaneous Changes in Alternative Measures of Shareholder Value

Change in ACSI	Contemporaneous Change in Equity Price	Contemporaneous Change in Price-to-Book Ratio
From 1994 to 1995	06**	09**
From 1995 to 1996	23***	12***
From 1996 to 1997	09**	04*

*p < 10
**p < 05
***p < 01

To test the moderating influence of competition on the association between ACSI and Tobin's q, we used our measure of concentration The findings appear in Table 5 Hausman's test (m = 538) again suggests that the IV/FE specification, M1, is appropriate

The interaction between satisfaction and industry concentration is positive and significant in the IV/FE estimation (p = 08), which indicates that the positive association between customer satisfaction and shareholder value is weaker when concentration levels are low and when the industry is fragmented The association is stronger in less fragmented markets with medium levels of concentration (HHI ranges from 10 to 61)

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[3] We checked the stability of the findings by splitting our sample in two ways (1) first two years versus last two years and (2) low-customer-satisfaction firms versus high-customer-satisfaction firms Chow tests show that the estimates are stable in both cases Because the 50,000 data points used to calculate firm-level ACSI scores are collected over the course of a year, we also tested whether the association between ACSI and q is stable across collection periods We found Chow tests for differences to be insignificant

TABLE 5
Moderating Impact of Degree of Competition on the Tobin's q–Customer Satisfaction Relationship

Model	Intercept	$\beta_{SAT,t}$	β_{AS}	β_{SHARE}	β_{CONC}	$\beta_{CONC \times SAT}$	ρ	R2	Number of Observations
M0 (ordinary least squares)	–2 43*** (2 465)	1 56*** (59)	03* (02)	16*** (06)	22*** (06)	1 54** (92)	—	25	456
M1 (IV/FE)	1 33** (52)	1 48* (81)	02 (02)	00 (02)	22 (23)	88* (51)	—	14	330
M2 (IV/FE/SC)	1 58* (89)	1 10 (91)	00 (02)	01 (02)	15* (09)	1 18* (68)	– 05	03	216

*$p <$ 10
**$p <$ 05
***$p <$ 01

Heterogeneity in the Association Between ACSI and Tobin's q

The preceding analysis focuses on the overall average association between customer satisfaction and shareholder value by taking steps to control for industry- and firm-level differences. However, we believe that heterogeneity within and across industries is interesting, in and of itself. In this section, we explore the nature and degree of such heterogeneity.

A possible approach is to perform a classic pooled versus unpooled test of Equation 3. However, given the limited number of time periods available per firm (four), this standard approach is not a viable option. Rather, we require a method that provides the benefits of pooling without giving up the requirement of parameter estimates for each industry and firm. An approach that meets these criteria is hierarchical Bayesian regression. From an intuitive standpoint, hierarchical Bayesian regression operates by "borrowing" information from across firms to improve firm-level estimates. In this process, it provides a way both to separate variance associated with industry-level differences from variance within industries and to introduce covariates to explain variance across firms and industries. We subsequently specify our hierarchical model of Tobin's q. For within firms,

(5) $\ln q_{ijt} = \pi_{0ij} + \pi_{1ij} \ln SAT_{ijt} + e_{ijt}$, where $e_{ijt} \sim N(0, \sigma^2)$

For within industries,

(6a) $\pi_{0ij} = \pi_{00i} + \pi_{01i} \ln AS_{ij} + \pi_{02i} \ln MS_{ij} + r_{0ij}$, where $r_{0ij} \sim N(0, \tau_0)$, and

(6b) $\pi_{1ij} = \pi_{10i} + r_{1ij}$, where $r_{1ij} \sim N(0, \tau_1)$

For between industries,

(7a) $\pi_{00i} = \pi_{000} + \pi_{001} \ln CONC_i + u_{00i}$, where $u_{0i} \sim N(0, \tau_{00})$,

(7b) $\pi_{01i} = \pi_{010} + u_{01i}$, where $u_{1i} \sim N(0, \tau_{01})$,

(7c) $\pi_{02i} = \pi_{020} + u_{02i}$, where $u_{1i} \sim N(0, \tau_{02})$, and

(7d) $\pi_{10i} = \pi_{100} + u_{10i}$, where $u_{1i} \sim N(0, \tau_{10})$

Equation 5, the Level 1 or "within-firm" equation, estimates the association between q and satisfaction for a given firm over repeated periods. The Level 1 dependent variable, q_{ijt}, represents Tobin's q for firm j in industry i during period t. The first term on the right-hand side of Equation 5, π_{0ij}, represents the firm-specific constant or fixed effect. Satisfaction, SAT_{ijt}, is the independent variable. The association between satisfaction and shareholder value for firm j in industry i is estimated by the coefficient, π_{1ij}.

Equation 6, Level 2 of the model, represents variation between firms within each industry. For Equation 6a, the first within-industry equation, we modeled the firm-specific effect for firm j in industry i, π_{0ij}, as a function of the industry-specific fixed effect, π_{00i}, and firm-specific controls: advertising-to-sales ratio and market share (Montgomery and Wernerfelt 1988). The error term, r_{0ij}, captures the unique firm-specific effect for firm j. Equation 6b models within-industry heterogeneity in the association between customer satisfaction and shareholder value, π_{1ij}. The first term, π_{10i}, represents the mean industry coefficient for the association, and the second term, r_{1ij}, represents the unique firm-specific effect that moderates the association.

Equation 7a (Level 3) captures heterogeneity across industries. Here, we incorporate cross-industry variation in fixed effects and the association between satisfaction and shareholder value into the model. We model the industry-specific fixed effect for industry i, π_{00i}, as a common fixed effect, π_{00}, and the concentration control variable (CONC) is suggested by application of Tobin's theory (Lindenberg and Ross 1981). Equations 7b and 7c model industry variation in the effect of the advertising-to-sales ratio and market share control variables. We model industry differences in the association between customer satisfaction and shareholder value in Equation 7d as a common fixed effect, π_{10}, and an industry-specific fixed effect, π_{10i}. To test for the moderating role of concentration, we rewrite Equation 7d as follows:

(8) $\pi_{10i} = \pi_{100} + \pi_{101} \ln CONC_i + u_{10i}$, where $u_{1i} \sim N(0, \tau_{10})$

A summary of the estimation results appears in Table 6. We find the association between ACSI and Tobin's q to be 1.63, compared with 1.62 in the preceding analysis (M1). The coefficients for the advertising-to-sales ratio and concentration remain positive and significant. Notably, when we separate out industry-level variance, we again find that market share has a significant effect within industries. Although the coefficient is only marginally significant (p = .08), that the coefficient emerges as positive suggests a firm-specific effect of market share. When industry heterogeneity is controlled, market share appears to be positively associated with shareholder value across firms that compete in the same industry.

Table 6 also reports the sources of variation in the association between shareholder value and customer satisfaction. The variance components represent the degree of heterogeneity in the estimates apportioned by level of analysis. The variance components for the association between shareholder value and customer satisfaction are 1.22943 across industries and 7.26775 within industries. These figures imply that 14.5% of the variance in the association between ACSI and Tobin's q is due to industry differences, and 85.5% is due to within-industry differences across firms. The within-firm, within-industry, and across-industry variance components for Tobin's q are .16377, .07677, and .09620, respectively. Therefore, 48.6% of the conditional variance in Tobin's q is at the firm level, 22.8% is due to within-industry firm-specific effects, and the remaining 28.6% is across industries. Thus, in our sample, firm-level differences in shareholder value and the link between satisfaction and shareholder value dominate industry-level differences. The findings are consistent with those of Rumelt (1991), who finds that nearly 50% of the variance in the rate of return is at the firm level, and approximately 10% is due to industry membership.

Industry-level empirical Bayes estimates of the association between customer satisfaction and shareholder value are shown in Figure 1. The estimates are greatest for department stores, supermarkets, and appliances, which implies a

TABLE 6
Assessing Industry and Firm Heterogeneity in the Association Between ACSI and Tobin's q

Independent Variable	Coefficient	Model 1	Model 2
Intercept	π_{000}	03	03
		(07)	(08)
ACSI	π_{100}	1 63***	1 51***
		(55)	(52)
Advertising to sales	π_{010}	14**	14**
		(06)	(06)
Market share	π_{020}	07*	06
		(04)	(04)
Concentration	π_{001}	70***	83***
		(21)	(24)
Concentration × ACSI	π_{101}		3 24*
			(2 06)
Sources of variation			
Within firm	σ^2	16377	16359
Within industry	τ_0	07677	07433
	τ_1	7 26775	7 06366
Between industries	τ_{00}	09620	09971
	τ_{01}	04618	04864
	τ_{02}	00211	00328
	τ_{10}	1 22943	83474

*$p < 10$
**$p < 05$
***$p < 01$

stronger association between satisfaction and shareholder value for this group than for industries such as automobiles, apparel, and personal computers Notably, goods and services appear to be spread throughout the distribution

As is shown in Table 6, we also estimated the model using concentration as a moderator of the association between ACSI and Tobin's q The coefficient for the interaction term is positive and significant (3 24) This finding indicates further support for our hypothesis that competitive intensity weakens the association between customer satisfaction and shareholder value [4]

Discussion

This study develops a new conceptual framework that links customer satisfaction to shareholder value and that brings the role of market structure into the nomological network that links the two key constructs Empirically, we document a positive association between customer satisfaction and shareholder value Given the overall estimate of the association between ACSI and Tobin's q of 1 62, a 1% change in customer satisfaction (as measured by ACSI) is associated with an expected 1 016% change in shareholder value (as measured by Tobin's q) The average level of Tobin's q for our overall data set is 1 73, which translates into an increase in q of approximately 027 for a 1% increase in satisfaction For a *BusinessWeek* 1000 firm with average assets of approximately $10 billion, a 1% improvement in satisfaction implies an increase in the firm's value of approximately $275 million This effect would be much greater for larger firms or for firms with a stronger association between satisfaction and shareholder value

The finding of a positive association between ACSI and shareholder value has important implications Although this study does not provide diagnostic guidance for managers who are exploring ways to improve customer satisfaction or for specific guidelines to implement customer satisfaction programs, it provides a strong rationale Firms that achieve higher customer satisfaction also create more shareholder wealth

The study also indicates that the association between customer satisfaction and shareholder value varies significantly across industries and across firms The link between the two is considerably stronger in some industries than in others, and further research should seek to understand the underlying industry characteristics that account for this finding Indeed, the degree of heterogeneity in the satisfaction–shareholder value link is even greater across firms in a given industry This latter finding strongly suggests that firm conduct, both strategy and implementation, matters more than industry context in determining whether the pursuit of customer satisfaction is consistent with the creation of shareholder value An understanding of the firm characteristics and actions that influence the association between customer satisfaction and shareholder value seems

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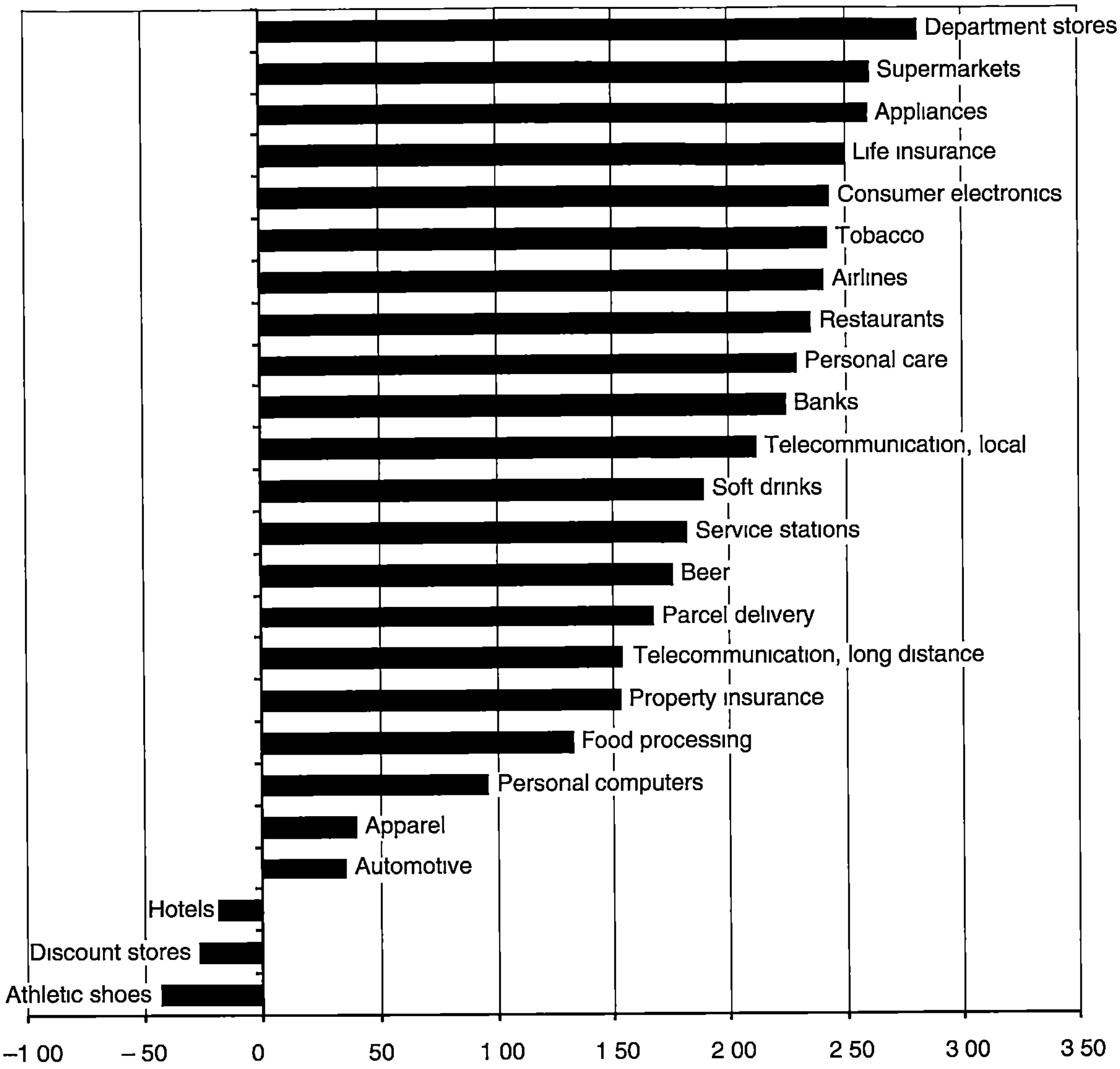
[4] We also tested other possible firm- and industry-level characteristics that we expected to moderate the association, including industry growth rates, capital intensity, advertising-to-sales and research and development ratios, and the type of industry in which the firm operated (i e , goods or services) However, we found no other factor to play a significant moderating role in our sample

FIGURE 1
Industry-Level Empirical Bayes Estimates of the Association Between ACSI and Tobin's q



to be a particularly promising area for further research in terms of developing useful implications for managers

We investigate the influence of the most logical moderator of the association between customer satisfaction and shareholder value an industry's market structure We find that the association between ACSI and Tobin's q is weaker in more fragmented industries in which rivalry should be, on average, more intense Our findings for market share and Tobin's q are also notable Market share does not appear to be a significant factor in enhancing financial performance, unless industry differences are controlled for and the within-industry association between market share and Tobin's q is isolated Under such conditions, there is a weak positive association between the two

Investors should note our findings The long-term nature of economic returns from improved customer satisfaction has important implications for the capital market valuation of the firm Loyal and satisfied customers represent a revenue-generating asset for the firm that is costly to develop and maintain Such an asset should figure prominently in assessments of a firm's future financial health If each firm provides a standardized customer satisfaction index score as part of its financial reporting, capital markets will be better informed

Further research in this domain should identify and test additional potential moderators of the association between satisfaction and shareholder value Another important direction for further research is to replicate the findings of the current study in other parts of the world in which national customer satisfaction measurement systems and active capital markets coexist In addition, future researchers could investigate the information content of ACSI and the role of such measures in conveying information in efficient markets It may be that such measures aggregate information that is otherwise difficult to observe, costly to obtain, and/or noisy, such as private information that individual customers possess about their consumption experiences and is therefore "unanticipated" by the market Because our data set consists of industries that range from "very fragmented" to "mildly oligopolistic," further research should also include more "strongly oligopolistic" or "monopolistic" industries It may be that the moderating effect of concentration is nonlinear and that the association between satisfaction and shareholder value is also attenuated at higher levels of concentration than are present in the current data set Future researchers also could determine whether our findings hold for other measures of shareholder value, including other approximations of Tobin's q Finally, we propose but do not test a new underlying logic for the association between customer satisfaction and shareholder value Further investigations should develop and test these arguments for how satisfaction influences customer loyalty and firm bargaining power and, in turn, shareholder value

In summary, the findings presented herein represent the strongest support to date for a positive association between customer satisfaction and shareholder value Although no single study can be regarded as definitive, the current investigation has several important strengths that readers might keep in mind as they weigh the findings First, it conceptually links customer satisfaction and shareholder value on the basis of the framework proposed by Srivastava, Shervani, and Fahey (1999) Second, the sample is based on ACSI As such, our measure of customer satisfaction is based on a nationally representative sample of actual customer experience with a particular firm's offerings, it is not self-reported by managers Furthermore, the ACSI database includes customer satisfaction measures for nearly 200 *Fortune* 500 firms, selected to represent fully the largest industries in the seven major sectors of the U S economy that end users directly experience Third, our measure of shareholder value, Tobin's q, is strongly grounded in the economic theory of firm long-term profit maximization (Lindenberg and Ross 1981, Tobin 1969) It provides a measure of firm value that is long term, risk adjusted, forward looking, and cumulative Tobin's q is generalizable and comparable across firms in different industries Finally, unlike existing research, this study employs a methodological approach to control for fixed, random, and time-varying "unobservable" factors that may bias empirical estimates of the association (Boulding 1990, Boulding and Staelin 1995, Jacobson 1990a)

Together, the findings of this study empirically affirm a fundamental principle of capitalistic free markets Sellers that do well by their customers are rewarded with more business from buyers and with more capital from investors Likewise, if businesses fail to satisfy customers as effectively and efficiently as competitors, customers and investors turn elsewhere The flow of investors and their capital moves hand in hand with the flow of customers and their business In theory, this is how free economies should operate, with the market allocating capital and other resources to create the greatest possible customer satisfaction in the most efficient manner possible It is also the reason utility maximization and the creation of a satisfied customer is a central strategic concern of any business Yet this study is the first to demonstrate this empirically By implication, the significance of marketing knowledge and marketing activity is accentuated For customer satisfaction is determined not only by quality but also by market segmentation and customer selection executed though product and service offerings, distribution channels, communications, and pricing Herein lies the immense contribution of marketing thought and practice that is yet to be fully realized

Appendix
Chung and Pruitt's (1995) Approximation of Tobin's q

$$\begin{aligned} q &= (\text{Market value of equity} + \text{book value of debt})/\text{Total assets} \\ &= (\text{Share price} \times \text{number of shares outstanding} \\ &\quad + \text{total value of preferred stock} + \text{long-term debt} \\ &\quad + \text{short-term debt})/\text{Total assets} \end{aligned} \tag{A1}$$

First, we obtained firm-specific identification numbers (Committee for Uniform Securities Identification Procedures numbers) of the publicly traded firms in the ACSI sample (both foreign and domestic) Second, we obtained share price and preferred stock value from the Center for Research in Securities Prices databases Third, we obtained long-term debt, short-term debt, and total assets from the COMPUSTAT databases

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Book Reviews

Roger A. Kerin

Reflections of a Marketing Educator with Scholarly Ambitions

Some years ago, I had the pleasure of teaching an undergraduate marketing principles class in a 500-seat auditorium at the University of Texas at Austin. Toward the end of the semester, a student in the class came to my office and politely inquired, "Are you Professor Kerin?" "Yes, come in," I replied. An astonished look covered the student's face as he exclaimed, "You look so different up close!" I tactfully ignored the remark but wondered what he expected to see in a close encounter. The same thought surfaced when Terry Clark asked me to write an essay that described the "personal and idiosyncratic aspects of my research, my research process, as well as the story of my formation and development as a scholar." However, I came to view Terry's invitation as an occasion to recall events and experiences, to recognize influential people and perspectives, and to acknowledge the role that choice and chance have played in shaping my academic career and my diverse scholarly pursuits. I also viewed his invitation as an opportunity to reflect on the origin and context of some of my published work and the context in which it was written. In doing this, I touch on my research orientation and highlight how my teaching interests and research endeavors have reinforced each other over the past two decades.

An Accidental Academic

I am now beginning my fourth decade as a marketing educator. My biography shows the receipt of a doctorate in business administration from the University of Minnesota in 1973 and a faculty appointment at Southern Methodist University (SMU) the same year. So much for recorded history. The experiences preceding these events would affect my approach to marketing education and scholarship for the next 30-plus years. Let me explain.

I have long considered myself an accidental academic. As a twentysomething pragmatist of the 1960s, graduate business education meant earning an MBA and embarking on a corporate career. Acceptance to the master's program at Minnesota was an auspicious start. I soon found myself immersed in classics such as Alfred Sloan's *My Years with General Motors* and Chester Barnard's *The Functions of the Executive*, enrolling in courses with names such as "Executive Leadership and Business Policy," and satisfying MBA core curriculum requirements. Application-based classes that featured case analyses, role-playing exercises, and field projects were of special interest to me.

My preference for hands-on classes was first noticed by Bill Rudelius, my graduate advisor. As I approached graduation, Bill asked me to join his business and university-sponsored consulting team to help assess retailing opportunities in a lower-income area of Minneapolis. The area of the city had suffered from civil unrest and vandalism of the kind common in the late 1960s, and its commercial structure was distressed. Over the following several months, I interviewed local residents and shop owners, deciphered trade-area census data, and prepared detailed feasibility studies for 14 separate retail outlets being considered for a neighborhood strip shopping center. This engagement was a fitting capstone for the practical graduate education I had sought. The experience of dealing with a consequential problem and of delivering actionable recommendations to an appreciative client on time and on budget was enormously gratifying. I have sought out that same gratification again and again over the years. The Minneapolis study also marked the beginning of a valued friendship with Bill Rudelius, who would become a trusted and tireless mentor. We subsequently published an account of the Minneapolis study (Rudelius, Hoel, and Kerin 1972). However, my attention at the time focused mainly on finding employment, which I secured one month before graduating with my MBA in August 1970.

I was offered a job with General Foods, in White Plains, N.Y., in its Maxwell House division, for the princely salary of $14,000. However, the next day, I received a letter from the University of Minnesota notifying me that I had been accepted into the doctoral program in marketing. I was dumbfounded, having never applied for admission! After confirming that the letter was not a hoax, and for reasons still mysterious to me, I declined General Foods' offer and

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entered the doctoral program Bill Rudelius agreed to serve again as my advisor

In the early 1970s, the Minnesota doctoral program had a strong behavioral thrust The curriculum included courses in psychology, experimental design, inferential statistics, and psychometric theory and methods, as well as requisite courses in marketing theory, marketing research, marketing management, and consumer behavior Given my interest in general management, I added several classes in organizational theory All in all, I suspect that my course of study was similar to that in contemporary Big Ten doctoral programs in marketing My texts included Alderson's *Dynamic Marketing Behavior*, Howard and Sheth's *Theory of Buyer Behavior*, Green and Tull's *Research for Marketing Decisions*, and the Brown et al casebook, *Problems in Marketing* Kotler's *Marketing Decision Making A Model-Building Approach* rounded out my formal graduate education in marketing At the time, I had no idea that I was reading what would become classics of the field [1] What I did know was that the experiential learning I had gained during my MBA was less frequent This was about to change

During the summer of 1971, Dick Cardozo asked me to join him in a case development effort at General Mills I had completed Dick's marketing management case study course the previous term, and he was about to introduce me to case writing The time spent at General Mills preparing the "General Mills Jet 24" case study was a crash course in new product development and commercialization for consumer packaged goods Jet 24 was a fruit-flavored concentrate that could be sprayed into a glass of water from an aerosol can The product was the firm's first venture into the beverage market, and it was a commercial failure Our task was to document General Mills' new product planning for Jet 24 from concept development through an early attempt at premarket testing, thus leading to the launch decision Interactions with General Mills' executives ignited a passion in me for case writing and teaching, which endures to the present day However, Bill Rudelius wisely pointed out that a collection of case studies "does not a thesis make," and he urged me to begin thinking about a dissertation topic while preparing for my comprehensive exams

My thesis examined the quality of self-report data in mail survey research I would later publish two thesis-related articles followed by a review and synthesis of empirical and methodological research on self-report data quality However, the real impact of my thesis (for me) was a collaborative relationship with Bob Peterson But I'm getting ahead of myself A week after defending my thesis, I packed my few belongings and drove to Dallas, where I joined the marketing faculty at SMU I was deeply appreciative of the position, given the weak job market at that time

When You Come to a Fork in the Road, Take It
—Yogi Berra

The School of Business at SMU was in transition when I arrived in August 1973 The school's emphasis on undergraduate education and teaching had been gradually broadening to emphasize its MBA program and faculty scholarship New faculty recruitment was viewed as the best way to achieve this The opportunity to be involved in this transformation appealed to me, and the faculty (notably Dick Hansen, the department chair and fellow Minnesota graduate) welcomed my enthusiasm for teaching and saw publication potential in my research

The environment at SMU was ideal for me Course development was encouraged, and consulting was common In six years, I prepped eight different courses (ranging from sales and business forecasting to consumer behavior), I taught undergraduate, MBA, and executive MBA classes, and I authored a dozen case studies (many based on my consulting) Early success in teaching indicated promise as an educator at SMU, however, the same could not be said for my scholarly achievements As things turned out, my scholarly ambitions were kindled while visiting the University of Texas at Austin during the 1976–77 academic year

I visited Austin primarily to work with Bob Peterson, another fellow Minnesota graduate Bob's scholarly talent was already obvious when, in 1970, Bill Rudelius introduced us, Bob was finalizing his dissertation, and I was completing my MBA We became reacquainted shortly after I settled in at SMU To my surprise, Bob was familiar with my thesis research and suggested the possibility of collaborative work Bob invited me to visit Austin, and I accepted without hesitation The results of my visit far exceeded my expectations Bob and I crafted several papers that year that lay the foundation for many future studies For good measure, we delivered the first of (now) ten editions of our casebook, *Strategic Marketing Problems Cases and Comments* At that time, Bob also introduced me to Vijay Mahajan, a future SMU colleague and an indefatigable coauthor Collaboration with Bob Peterson fueled my appetite for research However, our research efforts were not much related to my teaching and case writing interests I considered myself at the proverbial fork in the road, believing that my pedagogical interests were incompatible with my nascent scholarly ambitions Coincidence and opportunity would intervene to prove me wrong

Adventures in Serendipity

Upon returning to SMU, I reverted to case writing and course development The summer of 1980 found me at LaQuinta Motor Inns, preparing a case for an MBA marketing management course The case focused on the company's decision to broaden its target market beyond business travelers to include pleasure travelers While I was writing the case, the question arose of how the company could compare the complete preference order of motels in

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[1] It would take me several years to appreciate fully my doctoral training For example, while I was preparing a commemorative essay on the sixtieth anniversary of *Journal of Marketing* (Kerin 1996), I uncovered the readings packet and lecture notes from the marketing theory class taught by Edwin Lewis and discovered an orderly, historical account of marketing thought from the early 1900s through 1970 As a student of Wroe Alderson, Ed's perspective on the development of marketing theory and practice was an invaluable reference for me

the two segments to determine LaQuinta's relative position in the motel industry As fate would have it, I was also a committee member on an SMU statistics department doctoral thesis that examined alternative approaches for determining rank-order agreement on a common set of objects between two separate groups (albeit from a theoretical perspective) A light bulb went off, and I suddenly understood the LaQuinta problem as a practical application of the method (later published by Palachek and Kerin [1982])

This serendipitous episode changed my perspective on how case writing and research might be linked I began to appreciate how case writing could provide topics and ideas suitable for academic study A then recently published report by the Commission on the Effectiveness of Research and Development for Marketing Management (Myers, Greyser, and Massey 1979) offered encouragement for the research orientation that I envisioned for myself The report recognized problem-oriented research as a legitimate scholarly activity to the extent that the issues, methods, or problems studied evidenced generalizability It concluded with a statement that I have often come back to "Understanding practice, and contributing to it, can lead to major contributions to knowledge-development" (Myers, Greyser, and Massey 1979, p 29)[2] This report also conceded that problem-oriented research still lacked the respectability of basic research for knowledge building by the academic marketing community and therefore was not without risk as a career choice Undeterred, I decided to revisit previous studies and to pursue future case study (and consulting) settings with promising problem-oriented research opportunities and publication potential

The decision to stake my scholarly future on case writing and consulting activities fit my inductive approach to research Fortunately for me, the SMU marketing faculty had become populated by kindred spirits, including Bill Cron, Dan Howard, Michael Levy, and Vijay Mahajan, who were also inclined to turn problem-oriented research projects into scholarly manuscripts Our joint efforts included applying conjoint analysis to the design of channel-directed support programs, identifying marketing and trade show strategy-related variables that affect trade show performance, developing a methodology for assessing market penetration opportunities and saturation potential for multistore, multimarket retailers, and modeling word-of-mouth effects in the diffusion process for new products Dan Howard and I would explore causal relationships among variables that influence "value-for-the-money" perceptions of supermarket shoppers and would show empirically that brand name sound and meaning affect consumer brand-source inferences, while also highlighting the implications of this result for trademark infringement and brand name research Raj Sethuraman, Bill Cron, and I would use our collaboration with a large consumer electronics firm to show that choice-based conjoint analysis tasks conducted in an online environment may yield different (and more valid) results than those observed in conventional paper-and-pencil methods in new product research

To the casual observer, this bevy of projects may appear to be unrelated, but they shared a common purpose, consistent with the research orientation I had adopted All these projects originated from, benefited from, or were inspired by field-based case-writing efforts and consulting engagements, and all aimed to improve the marketing practice of the phenomenon under investigation Equally important, as a marketing educator, I found the coalescence of case writing and problem-oriented research indispensable to course development (and vice versa)

Course Development and Programmatic Research

New and ongoing course development has played a central role in motivating my research and textbook writing (Kerin et al 2003) For me, course development and case writing are synonymous Since 1973, I have authored some 60 case studies and have been involved in the creation of a dozen courses What I have found is that course development efforts discipline my examination of marketing phenomena For example, I developed an MBA course ("Interactive and Multichannel Marketing") to determine how marketing concepts and practices (as I understood them) were affected by the Internet Although case writing is time consuming and labor intensive, I have discovered that for me, as an element of course development, it has a triple purpose (1) It serves as a pedagogical device, (2) it aids deeper thinking, and (3) it stimulates innovative research Two of my course development experiences stand out in this regard

During the summer of 1981, I began revising a popular executive MBA and MBA course that featured Abell and Hammond's *Strategic Market Planning Problems and Analytical Approaches* The revision was initiated by student requests to broaden the case assignments beyond the technology-based companies that appeared in the text I chose to write a case on Zale Corporation, which then was one of the largest publicly held diversified specialty retailing companies in the United States and the world's leading retailer of jewelry merchandise My original intent was to illuminate market strategy and resource allocation options for a multidivisional retailing firm However, a more interesting question soon became apparent Are corporate sales and asset growth objectives on the one hand and financial policies on the other hand synergistic (or otherwise) in creating shareholder wealth? This question sparked my curiosity about the interface between marketing and finance in strategy formulation, implementation, and evaluation The Zale Corporation case prompted three articles coauthored with finance faculty who also thought the topic worthy of study The first article (Higgins and Kerin 1983) documents sustainable growth challenges for a cross-section of retailers, outlines marketing and financial "solutions" for balancing sales and asset growth and earnings, and indirectly examines the influence of each on shareholder wealth creation The second article (Kerin and Varaiya 1985) explores the shareholder wealth consequences of retail mergers and acquisitions and demonstrates why this popular growth strategy rarely yields the intended value to stockholders of the acquiring firm The third article (Varaiya, Kerin, and Weeks 1987) explores shareholder wealth creation and erosion from the perspective of value-based planning models, which were then receiving extensive but uncritical coverage in the business press This research examines the empirical validity of these models for assessing corporate strategy and cautions prospective users to the conditionality of their prescriptions for managerial action I wrote a supplemental course note to summarize this research to accompany both the Zale Corporation case and the course lecture titled "Strategic Financial Analysis"

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[2] During my term as editor of *Journal of Marketing* (1988–90), I would frequently cite this study and quotation I like to think that some of the best articles published during my editorial term were based on problem-oriented research that contributed to practice improvement and knowledge development in marketing

By 1986, the strategic market planning course had been substantially revised Vijay Mahajan was teaching a companion class at the time, and he suggested that we document the changes reflected in our course material He would introduce me to Rajan Varadarajan, whose encyclopedic knowledge of the literature was instrumental in our preparation of a "state-of-practice" article on strategic market planning (Mahajan, Varadarajan, and Kerin 1987) We would later elaborate on this work with the publication of *Contemporary Perspectives on Strategic Market Planning* (Kerin, Varadarajan, and Mahajan 1990) A few years later, the Vice President of Strategic Planning at a large telecommunications firm showed me a dog-eared copy of the book and asked me to deliver an executive seminar on the material he had highlighted The seminar led to an invitation to integrate our material into the firm's planning process A valuable lesson on implementation issues in market planning was, in turn, brought back to the classroom

My research on consumer product and brand management and an MBA course with the same title benefited from multiple cases written at Frito-Lay and a 20-year association with Dwight Riskey, presently the Senior Vice President for Consumer and Customer Insights at PepsiCo Dwight's eye for strategic issues and fondness for challenging case development were instrumental in the formation of my views and writing on first-mover advantage, product cannibalism, brand equity, and brand valuation For example, insight I gained in chronicling Frito-Lay's successful pioneering effort with SunChips Multigrain Snacks resulted in two articles The first article (Kerin, Varadarajan, and Peterson 1992) proposes a conceptual framework for identifying the sources of first-mover advantages and product-market contingencies that moderate the relationship between order of entry and competitive advantage The second article (Kerin, Kalyanaram, and Howard 1996) shows that the magnitude of order-of-entry effects depends on whether a firm pioneers a product class or product form and whether a new brand or brand extension strategy is used

My interest in brand valuation was stimulated while I was drafting a case on Frito-Lay's marketing and financial analysis, before the acquisition of the Cracker Jack brand from Borden in 1997 Subsequent research (Kerin and Sethuraman 1998) inspired by this case helped identify a positive relationship between a firm's accumulated brand values and its ratio of market value to book value, but it also revealed that the functional form of the relationship appears to be concave, with decreasing returns to scale An additional dividend from my association with Dwight Riskey has been his willingness to work with me on writing intelligible and practicable supplemental class reading materials to accompany course case studies and lectures We would subsequently publish two of these course notes one on product cannibalism (Kerin and Riskey 1994) and the other on PepsiCo's global brand equity model (Kish, Riskey, and Kerin 2001)

Closing Thoughts

As I look back on my educational and professional experiences, I humbly acknowledge that I have been fortunate in many ways My mentors, notably Bill Rudelius and Dick Cardozo, provided opportunities and guidance at critical moments in my graduate education Both have been role models for me whenever I have been called on to guide graduate students Providential introductions to Bob Peterson, Vijay Mahajan, and Rajan Varadarajan stimulated my intellectual curiosity and furthered my research and writing interests I am deeply indebted to this charmed circle of marketing scholars as well as to my many talented coauthors They, more than me, can describe the idiosyncratic aspects of my research style

Above all, I have been fortunate in being able to combine my passion for case writing and teaching with scholarly pursuits In doing this, I take some satisfaction in developing course content that is uniquely my own, for better or for worse Continuous course development through case writing and related research fuels my enthusiasm for the subject matter, which I hope is conveyed to and appreciated by students

In writing this essay, I have no illusions that my research orientation and process is suitable for everyone, let alone anyone However, it has served me well I fully expect that tomorrow, if not the next day, will bring a case-writing opportunity that will change my view on marketing practice and plant the seed for a new course or research topic This is a comforting thought as I embark on my fourth decade as a marketing educator

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